JOURNAL
OF THE
AMERICAN VETERINARY MEDICAL ASSOCIATION

In This Issue

GENERAL ARTICLES

Antibiotic Therapy in Veterinary Medicine—*S. F. Scheidy* 213
Immediate Effect of the Atomic Bomb on Japanese Army Animals with the Hiroshima Division—*Donald Lee Bush* 221
The Hog Cholera Problem in the United States 227
Physical Concept of the Atom and Nuclear Energy—*John H. Rust* 229

SURGERY AND OBSTETRICS

Epileptiform Manifestations of Endocrine Disturbances Associated with Adrenal Tumors—*Frantisek Kral* 235

CLINICAL DATA

A Four-Year Study of Listeriosis in Michigan—*M. L. Gray; H. J. Stafseth; Frank Thorp, Jr.* 242
Bovine Fetal Synarthrophysis—*D. D. Delahanty* 252
The Hematologic Examination of the Blood of Sheep Under Physiologic and Pathologic Conditions—*Hussien Reda and A. F. Hathout* 253
Cortisone Treatment in a Dog—*A. G. Misener and H. H. Stanton* 255

NUTRITION

Nutritional Aspects of Resistance—*Laurence U. Chandler* 256

EDITORIAL

The Hog Cholera Problem 261

Surgery and Obstetrics 235
Clinical Data 241
Nutrition 256
Editorial 261
Current Literature 263
The News 26

AVMA Report, ad page 8; Coming Meetings, ad page 24

(Contents continued on ad pages 2 and 4)

Volume CXVIII APRIL 1951 Number 889

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VII. The Birth of Scientific Veterinary Medicine

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CONTENTS

(*Continued from Cover*)

SURGERY AND OBSTETRICS

Historic Gastrotomy 240
Management of Vibrionic Abortion 240
Pregnancy Test in Mares 240
Breeding Efficiency in Dairy Cattle 240
Fertilization in Vitro 240
Insemination and Conception 240

CLINICAL DATA

Louse Control in Farm Animals 241
Your 1950 Proceedings Book 241
Blackhead in Turkeys 255
Parasites in Colts 255
Esophagic Auscultation of the Heart 255

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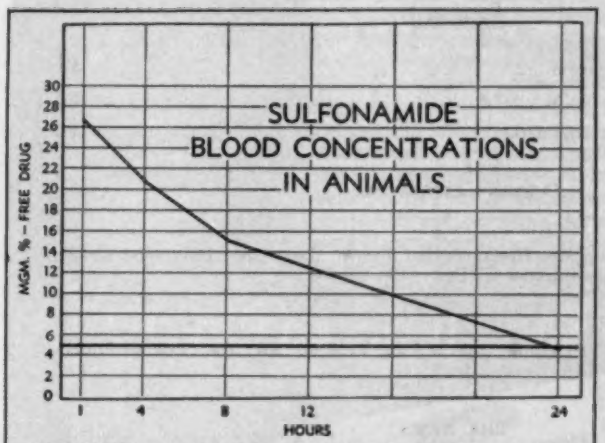

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CONTENTS—Continued

NUTRITION

Nutrition and Animal Health 260
Thyroprotein Feeding in Midsummer 260
"Promotants" in Nutrition 260
Nutrition and Calories 260

EDITORIAL

Hog Cholera Eradication Resolution 261
Dr. Klussendorf Resigns from AVMA Staff 262
Dr. Donham Appointed Editor ad Interim 262

CURRENT LITERATURE

ABSTRACTS

Genital Infections in Bulls, 263; Hematology of Barren Mares, 263; Infectious Anemia, 263; Salmonella and Proteus Infections in Dogs and Cats, 264.

BOOKS AND REPORTS

The Boston Terrier, 264; Laboratory Apparatus and Reagents, 264; The Chemical Formulary, 264; Received But Not Reviewed, 264.

THE NEWS

Eighty-Eighth Annual Meeting—New Techniques To Be Shown on Closed-Circuit Television 265
Plans for First Pan American Veterinary Congress in Peru are Progressing 266
Predoctoral Alumni Fellowships Available 267
AVMA Research Fellows 267
Student Chapter Activities 267
Women's Auxiliary 268
U. S. Government 269
Applications 270
Among the States and Provinces 271
Veterinary Military Service 273
Emergency Planning 274
Deaths 278

MISCELLANEOUS

Global Foot-and-Mouth Disease Eradication, 228; Notes from the Third Inter-American Congress on Brucellosis, 234; Mastitis Treatments Compared, 234.

Watch Your English and Ours; Coming Meetings ..... ad page 24

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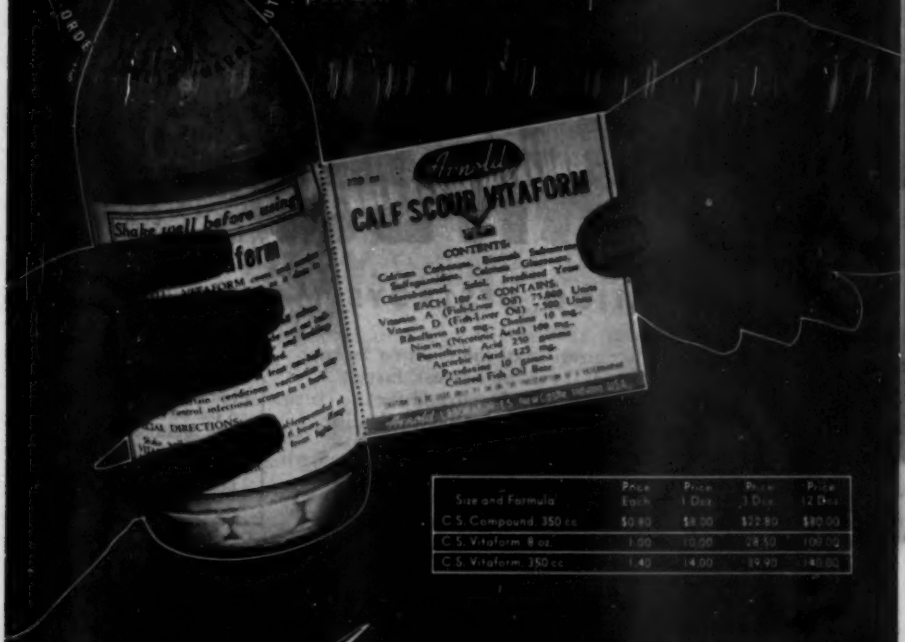
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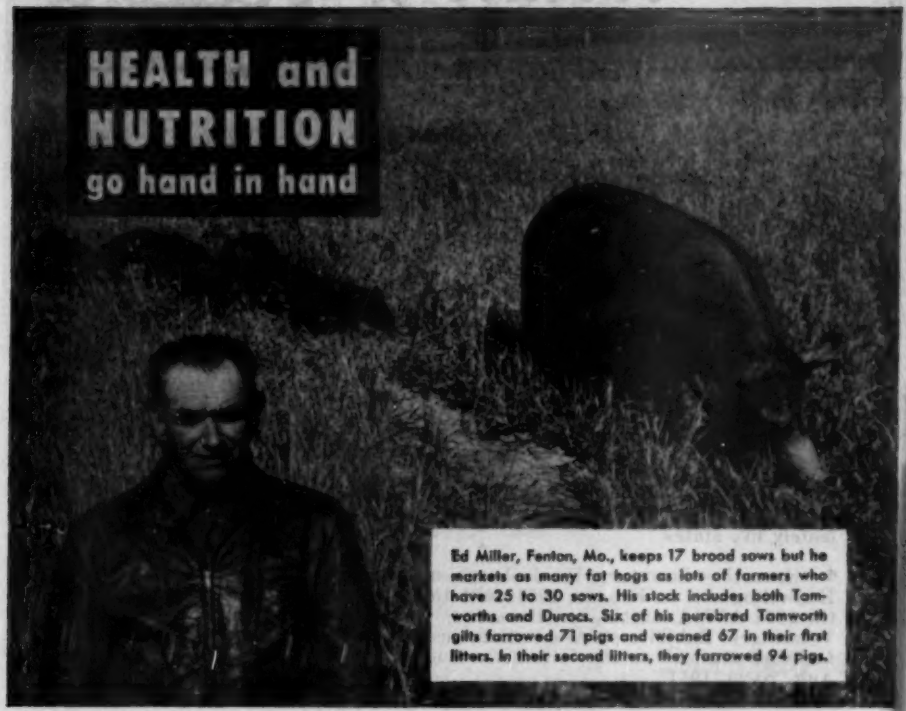

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AVMA ☆ Report

Veterinary Medical Activities

✦ Dr. R. C. Klussendorf tendered his resignation to the Board of Governors on Dec. 17, 1950, to become effective on April 1, 1951, upon the completion of six years of service with the AVMA. Editorial announcement appears in this issue on p. 262.

★ ★ ★

✦ The Board of Governors met at the AVMA office on Saturday, Feb. 24, 1951. The principal item of business was to consider qualifications of persons suggested for the position of editor-in-chief.

★ ★ ★

✦ The Special Committee on Veterinary Services met at the Peabody Hotel, Memphis, Tenn., on Feb. 22, 1951, in conjunction with the Sixth National Conference on Rural Health, sponsored by the American Medical Association, for the two succeeding days. Present were Chairman E. J. Frick, Executive Board Chairman W. G. Brock, and committee members W. T. Oglesby, C. D. Van Houweling, and I. D. Wilson.

★ ★ ★

✦ Chairman W. R. Krill and Secretary C. D. Van Houweling, of the AVMA Emergency Advisory Committee, have attended a series of regional meetings on civil defense problems during the past months. Each meeting covered approximately five states.

★ ★ ★

✦ Executive Secretary Hardenbergh and Assistant Executive Secretary Van Houweling met on Feb. 20, 1951, with the Local Committee on Arrangements for the 1951 AVMA meeting in Milwaukee. Dr. J. Lavere Davidson, president of the Veterinary Exhibitors' Association, accompanied them to inspect the exhibit facilities available in the Milwaukee Auditorium for the AVMA annual meeting, Aug. 20-23, 1951.

★ ★ ★

✦ Television will again be a feature of the AVMA annual meeting in Milwaukee, Aug. 20-23, 1951. Closed-circuit (restricted audience) telecasts of clinical, surgical, and laboratory procedures will be presented, as compared with the public telecast of the fracture panel at Detroit in 1949.

★ ★ ★

✦ The "Proceedings Book" has been mailed to all AVMA members. The book contains all of the proceedings of the 87th Annual Meeting of the AVMA held in Miami Beach in August of 1950, *i.e.*, the scientific papers presented, the opening and closing sessions, the postconvention trip to Havana and adjourned session there, and the business sessions of the AVMA. If you have not received your copy, it is time to do some checking. Members receive a copy of the "Proceedings Book" without charge. Nonmember subscribers may obtain a copy at the established price of $4.00—with a special rate for libraries and students (*see* p. 241).

★ ★ ★

✦ Dean C. S. Bryan, of Michigan State College, attended the annual AMA Conference on Medical Education and Licensure in Chicago on Feb. 12-13, 1951. He represented the Association of Deans of American Colleges of Veterinary Medicine, and Drs. J. G. Hardenbergh and C. D. Van Houweling represented the AVMA.

★ ★ ★

✦ Assistant Executive Secretary C. D. Van Houweling represented the profession of veterinary medicine at the career conference held by the University of Illinois at Urbana on Feb. 28, 1951.

★ ★ ★

✦ Last December, a paper quota was imposed on the JOURNALS of the AVMA for 1951 and, in February, we were advised a further reduction in paper consumption was necessary, effective immediately. This means that we are now forced to accept fewer manuscripts submitted to the JOURNAL of the AVMA and also the *American Journal of Veterinary Research*.

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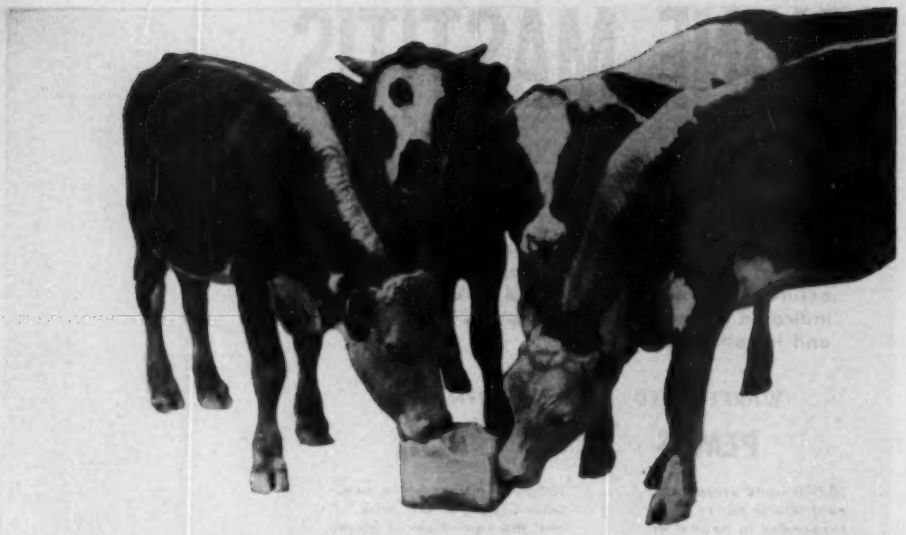

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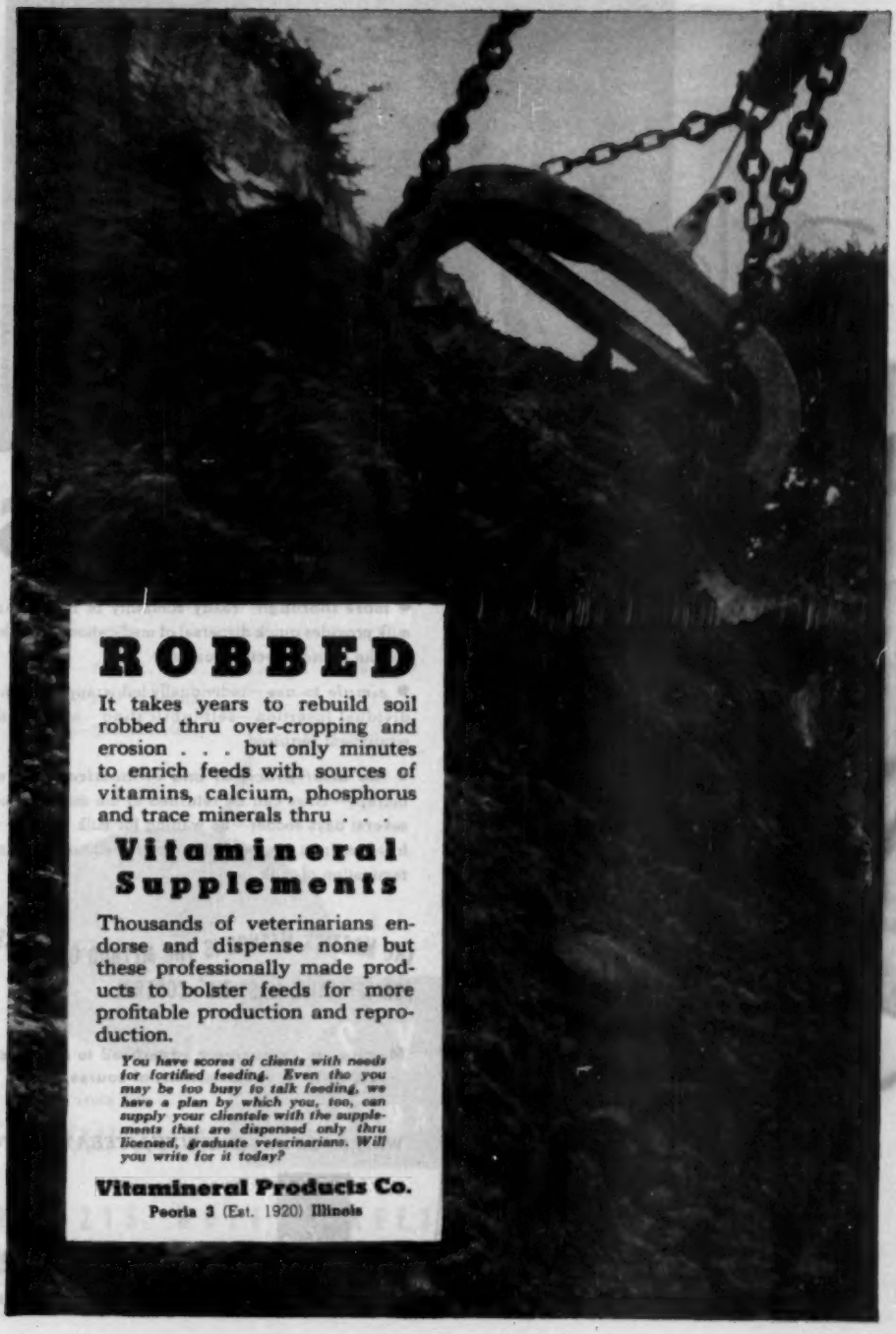
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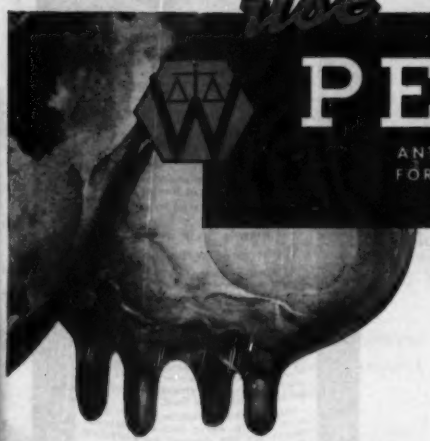

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Antibiotic Therapy in Veterinary Medicine

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THE TERM "antibiotic therapy" generally is used to refer to the utilization of antibacterial substances produced by microbial organisms in the treatment of disease. This type of preparation is relatively new in the medical fields but is widely used today.

The following antibiotics currently are of clinical interest: tyrothricin, penicillin, streptomycin and dihydrostreptomycin, bacitracin, aureomycin, chloramphenicol (chloromycetin), and terramycin.

TYROTHRICIN

Tyrothricin was discovered in 1939 by Dr. René Dubos,[1] a bacteriologist working at the Rockefeller Institute for Medical Research. This antibiotic substance is produced by *Bacillus brevis*. Tyrothricin actually is a mixture of substances: It is composed of gramicidin (approximately 25%), tyrocidine (about 60%), and a mixture (about 10%) of other active substances related to gramicidin. Commercial tyrothricin contains fat (about 2%) and sodium chloride (3%). It is relatively insoluble in water but dissolves in alcohol or propylene glycol. The substance is stable under most conditions, and it is unique in this respect as compared with most other antibiotics.

When tyrothricin is given intravenously, even in low dosage, it is toxic, having an $l.d._{50}$ of about 2 mg. per kilogram of body weight. The material will cause hemolysis of red blood cells. Tyrothricin is recommended only for topical application; this includes, of course, intramammary instillation. It is considered to be ineffective when given orally.

Streptococci, staphylococci, clostridia, and aërobic streptococci are some of the bacteria sensitive to tyrothricin. The substance is bacteriostatic and bactericidal but inactive against most gram-negative organisms.

Clinical Indications.—Clinical studies reported by a number of investigators[2-7] indicate that tyrothricin is useful in the treatment of bovine mastitis. This was the first antibiotic substance released for general distribution in this country (early in 1942) and it was recommended specifically for the treatment of bovine mastitis. Tyrothricin preparations are used in both the veterinary and human medical fields in the treatment of infected wounds[8] and cavities,[9,10] ulcers, furunculosis, osteomyelitis, burns,[11] and draining sinuses. It is used in solution for irrigation or in the form of wet dressings, emulsions, or ointments. It is added also to other agents such as vasoconstrictors and scabicides[12,13] for topical use in certain conditions.

TABLE 1—Infections Which May Be Expected To Respond to Tyrothricin Therapy

Mastitis—streptococcic and staphylococcic	Furunculosis
Infected wounds	Cellulitis
Ulcers	Osteomyelitis
	Draining sinuses

Dosage forms are: alcohol and aqueous solution, oil emulsion, ointment, and cream, with vasoconstrictors, with scabicides, and with sulfonamides for local use.

PENICILLIN

Penicillin had a profound influence on chemotherapy during World War II and now is used

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widely throughout the civilized world. This substance was discovered by Fleming of England in 1929.[14] However, it did not become available for clinical usage until early in 1945.

Penicillin is produced by *Penicillium notatum* and related species. During the year 1949, 133,230 billion Oxford units, or approximately 98 tons, of penicillin were certified by the United States government.[15]

Early supplies of amorphous penicillin were not satisfactory from a stability standpoint, but the crystalline penicillin of today has overcome many of these objections.

The common penicillins are of types G, F, K, X, and O; however, type G most frequently is used clinically. This type is quite satisfactory for chemotherapy and is available in large quantities. With today's purification procedures, 1 mg. of penicillin has a potency of approximately 1,600 units.

Several salts of penicillin have been prepared and their characteristics are worthy of consideration in selecting the drug for treatment of disease. The sodium and potassium salts are readily soluble in water and may be administered by any route. The procaine and aluminum salts of penicillin are not readily soluble in water; thus, selected routes for their administration are suggested. These salts should not be given intravenously. Sodium, potassium, and/or procaine salts usually are used in the various dosage forms.

Absorbed penicillin is eliminated rapidly from the body by the urinary tract. About 20 per cent is excreted by the glomeruli and about 80 per cent by the renal tubules. This rapid excretion can be delayed only by the administration of compounds that compete with penicillin for the enzymes that control the mechanism of tubular excretion. Such compounds are diodrast,[16] para-aminohippuric acid,[17] carinamide (4'-carboxy-phenyl-methane sulfonanilide,)[18] and benemid p-(di-n-propylsulfamyl) benzoic acid.[19]

Various dosage forms of penicillin have been prepared to delay the rapid absorption—and hence rapid excretion of penicillin when the agent is administered intramuscularly or subcutaneously. Procaine penicillin, particularly, is acceptable for such dosage forms because of its slow absorption. Preparations containing substances such as oil, beeswax, and aluminum monostearate must not be given intravenously. The minimal parenteral dosage of penicillin for animals should be at least 2,000 units per pound of body weight every three to four hours when given in an aqueous medium (sodium and potassium salts); every twelve hours when given in oil and beeswax; and, when used in a repository dosage form, such as procaine penicillin in oil, or water with or without aluminum monostearate, at intervals of twenty-four hours or longer.

For intramammary administration in the treatment of mastitis due to *Streptococcus agalactiae*, 25,000 to 100,000 units have proved useful.[20]

Oral administration of penicillin in animals is not used widely; however, experimental studies[21] indicate that appreciable quantities of penicillin are absorbed from the gastrointestinal tract. On the average, about 9 to 10 per cent of the total dose given by mouth to dogs is excreted in the urine. Toxicity studies[22] indicate that relatively large amounts of penicillin may be given without producing toxic manifestations. The $L.d._{50}$ (intravenous) dose of penicillin type G is about 5,000,000 units per kilogram for mice.

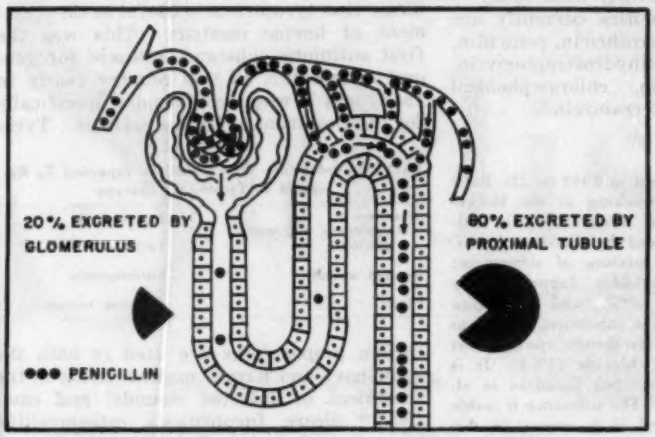

Fig. 1—Concept of the renal elimination of penicillin. Eighty per cent of penicillin in the blood is lost by tubular excretion, while the remaining 20 per cent is filtered through the glomerulus.

Clinical Indications.—According to published reports, it would appear that penicillin is a most useful agent in the treatment of bovine mastitis,[23-33] especially in-

fections caused by streptococci and/or staphylococci. Penicillin in various dosage forms (aqueous solution or suspension, in oil, ointments, bougies, and with other

TABLE 2—The Following Diseases May Be Expected To Respond to Penicillin Therapy

Mastitis
Secondary invaders associated with equine influenza and strangles in horses
Secondary invaders associated with shipping fever and pneumonia in animals
Peritonitis—mixed infections
Osteomyelitis
Leptospirosis
Secondary (bacterial) distemper in dogs and cats
Pyelonephritis in cattle
Swine erysipelas

agents) appears to be satisfactory. The antibiotic agent is not injurious or irritating to the tissue lining the duct system of the bovine mammary gland. Low and high dosage has been used by intramammary instillation for the treatment of mastitis. Doses of from 25,000 to 300,000 units per quarter per treatment generally are employed. Combinations of penicillin with other antibiotic substances, especially streptomycin, also are used to increase the spectrum of antibacterial activity of the treatment of udder infections.[56]

Dosage forms of, and vehicles for, penicillin for use by intramammary instillation have received considerable attention. Reports indicate that when the sodium salt of crystalline penicillin in aqueous solution is given, most of it is absorbed from the udder tissue or removed with the milk within twenty-four hours.[57] When such penicillin is mixed with an emulsion consisting of mineral oil, water, and lanolin, more persistent levels are maintained in the udder.[52,57] This also is true when procaine penicillin is administered in ointment or bougies, or in oil with or without aluminum monostearate.[57,58] It is indeed interesting to note that appreciable penicillin concentrations are found in the foremilk of cows treated with a given dose of penicillin in certain forms over seventy-two hours, during which time the cows are milked at twelve-hour intervals.

Penicillin therapy is indicated in the leptospiremic stage of leptospirosis in dogs.[59,60] The agent, however, is not satisfactory for the treatment of chronic cases or carriers of Leptospira, where the parasites are in kidney and liver tissue.[61]

Reports indicating that penicillin is effective also in the treatment of anthrax,[62,63] pyelonephritis,[64,65] erysipelas,[67,68] strangles,[69] mixed bacterial infections, and septicemia caused especially by gram-positive organisms have been published.

Dosage forms are: powder for aqueous solution, penicillin in oil and beeswax, procaine penicillin in oil, procaine penicillin in aqueous suspension, procaine penicillin in oil and aluminum monostearate (also with sodium or potassium penicillin), penicillin tablets of two types: (1) water soluble; (2) compressed tablets (with and without buffering agents), penicillin bougies, and penicillin ointments are available commercially.

Streptomycin and Dihydrostreptomycin

Streptomycin is produced by *Streptomyces griseus*. It was discovered by Dr. S. Waksman and associates.[70] A minor chemical treatment of streptomycin will result in dihydrostreptomycin, which is somewhat less toxic than is the original substance. In 1949, 82,699,137 Gm., or approximately 92 tons, of this antibiotic agent were produced in this country.[71] Streptomycin and dihydrostreptomycin are relatively stable in dry form or in an aqueous medium. Streptomycin is available as the dihydrochloride, sulfate, or calcium chloride complex, while dihydrostreptomycin is available as the sulfate. In most instances, these salts are interchangeable except when one wishes to mix the substance with certain other agents. The calcium chloride complex will cause a precipitation in phosphate-buffered solutions. This antibiotic is eliminated rather rapidly from the body by the urinary system, although not nearly so rapidly as is penicillin. Delayed absorption or excretion of it following intramuscular administration has not yet been accomplished. Intramuscular administration is recommended for the treatment of systemic infections and oral administration for the treatment of enteric infections. Streptomycin is not absorbed from the gastrointestinal tract to any appreciable degree. A minimum of 3 to 6 μg. (units) per milliliter of plasma are considered to be necessary to overcome most of the susceptible organisms. Five milligrams of streptomycin per pound of body weight given intramuscularly in dogs will result in a level of from 6 to 11 μg. per milliliter of plasma after about four hours. Twice this amount will produce significantly higher plasma levels for longer periods of time. Five milligrams per pound of body weight in dogs will result in a concentration of about 100 μg. per milliliter of urine in nine hours. Excessive parenteral dosage may cause

vestibular disturbance in animals similar to that observed in human patients. The l.d.$_{50}$ dose of streptomycin is about 4,500 mg./kg. in mice. In the treatment of certain enteric infections in dogs, a dosage of ½ or 1 Gm. twice daily is suggested.

Clinical Indications.—Streptomycin and dihydrostreptomycin generally are used in the treatment of infections due to certain gram-negative organisms or gram-positive organisms resistant to pencillin. Of these, *Escherichia coli* possibly is the most important in animal diseases. Enteric infections,[72,73] and some urinary tract infections have been treated successfully with the substance. Bovine mastitis[74,75] caused by *E. coli* has been treated successfully by the intramammary instillation of the antibiotic in aqueous solution. Usually ¼ to 1 Gm. of drug is given into each infected quarter and this procedure is repeated as indicated by the response.

TABLE 3—Infections Which May Be Expected To Respond to Streptomycin Therapy

Canine dysentery associated with gram-negative organisms such as Proteus and Borrelia (Spirochaeta)
Canine and feline distemper complicated by gram-negative bacillary infections
Peritonitis due to Escherichia coli in dogs
Calf pneumonia due to susceptible gram-negative organisms
Bovine mastitis due to Acidobacterium aerogenes and E. coli
Navel ill due to Shigella equirulis in foals
Erysipelothrix rhusiopathiae infection in turkeys
Leptospirosis in dogs

Streptomycin has been found to be useful in the treatment of sinusitis in turkeys; 100 to 150 mg. in 1 to 2 ml. of water are injected directly into the affected sinus.[76,77] One or two applications appear to be quite effective in such cases. Streptomycin in doses of 0.5 Gm. every three to four hours parenterally appears to be an effective agent in cases of pyosepticemia in foals,[78] if treatment is begun early. Chronic renal leptospirosis in dogs has been treated successfully with streptomycin.[79] Treatment for five days with this antibiotic was found to be fully effective in a limited number of dogs. In one experiment, 40 mg. of streptomycin (in oil and wax) per kilogram of body weight was effective when given daily for three to five days. Streptomycin injected into and around lesions of actinomycosis in cattle appears useful in arresting the infection.[80]

Preliminary reports[81,82] indicate that 1 to 2 Gm. in 10 to 50 cc. of sterile water appears to be beneficial in the treatment of *Vibrio fetus* infection in the uterus of cattle. The treatment is given by the intrauterine route, usually when the animals are in estrus.

Dosage forms are: powder for aqueous solution, bougies, and ointment with and without penicillin.

BACITRACIN

Bacitracin is produced by *Bacillus subtilis*. It was discovered by Meleney and Johnson.[83] This substance is quite soluble in water but is not stable in solution for a very long time. It is stable in a dry state for long periods when it is not exposed to high temperature. Solutions of bacitracin kept at refrigerator temperature will begin to lose potency in about three weeks. Bacitracin in an anhydrous ointment is stable for one year or longer. Water-miscible ointments lose potency quite rapidly.[84]

Bacitracin possesses antibacterial activity primarily against gram-positive organisms and against amoebae. Preparations containing bacitracin, usually solutions or ointments, are applied topically to infected lesions. In certain instances it has been injected into and around infected areas.

Rose[85] recently published a report indicating that bacitracin has a low order of toxicity for dogs, that it can be used topically or administered orally and systemically. Parenteral use of the substance, however, has not been encouraged, since in early studies it was found to produce nephrotoxic effects in some experiments. The l.d.$_{50}$ dose was 360 mg. (about 7,500 units) per kilogram in mice.[86]

Bacitracin ointments containing 500 units of the antibiotic per gram of the base have been found to be useful in the treatment of otitis externa, wounds, and purulent conjunctivitis. Ophthalmic ointments and not topical ointments are suggested for use on eyes. Aqueous solutions containing 500 units per milliliter of the substance are used as wet dressings or for irrigation of infected lesions. Solutions or tablets in doses of about 10,000 units four times daily have been given orally as treatment for diarrhea in dogs.[87] In a limited number of pigs, bacitracin has been found

TABLE 4—Infections Which May Be Expected To Respond to Bacitracin Therapy

Mastitis
Superficial abscesses
Cellulitis
Furuncles
Ulcers
Suppurating surgical and traumatic wounds
Osteomyelitis
Draining sinuses
Skin infections

beneficial as a chemotherapeutic agent when administered orally in the treatment of swine dysentery.[88] Rose[94] reported that systemic infections in dogs have been treated by intramuscular injections of an aqueous solution containing 1,000 units of the antibiotic agent per kilogram of body weight for three to five days.

Dosage forms are: bacitracin for aqueous solution, ophthalmic and topical ointments, and tablets for oral use are available commercially.

AUREOMYCIN

Aureomycin is produced by *Streptomyces aureofaciens;* it was discovered by Dr. B. M. Duggar.[89] This antibiotic substance, supplied as the hydrochloride, possesses a wide spectrum of activity against bacterial, rickettsial, large viral, and some protozoan organisms. Because of this spectrum of activity, it is used widely in the treatment of disease. The substance is stable for a long time in a dry state. Aureomycin may be administered orally, intravenously, or topically. Effective blood levels can be obtained and maintained following oral administration of the substance. When intravenous therapy is indicated, only fresh and properly prepared solutions should be used and precautions to prevent leakage into perivascular and subcutaneous tissue should be taken. Such solutions are irritating to subcutaneous tissues. Aureomycin should not be administered in therapeutic amounts to adult ruminants, since it will destroy important rumen flora, thus causing digestive complications.

Aureomycin is found in the urine within one hour following oral administration. Tissue concentrations from 2 to 4 times that in the blood have been observed. The concentration in the cerebrospinal fluid of treated animals is about equal to that found in the blood. Aureomycin appears to be concentrated in urine and milk. Traces of the substance have been found in urine seventy-two hours after the last dose was administered. The $l.d._{50}$ intravenous dose of aureomycin hydrochloride is 134 mg. per kilogram of body weight in mice, and 118 mg. per kilogram in rats.[90]

The suggested dosage of aureomycin for animals when given intravenously is 5 mg. per pound of body weight and this is repeated at 24-hour intervals unless oral treatment is provided. When the drug is to be administered orally, it is suggested that the initial dose be 25 mg. per pound of body weight and 12.5 mg. every twelve hours thereafter until the animal shows definite signs of improvement. In the treatment of bovine mastitis, the ointment form usually is given by intramammary instillation of about 7 Gm. of ointment base containing 200 to 400 mg. of aureomycin.

Clinical Indications.—According to published reports, aureomycin is useful in the treatment of bovine mastitis.[91-94] Encouraging claims are made for its use in cases where staphylococci appear to be the cause of the disease. Streptococcic infections likewise yield to aureomycin therapy. Pneumonia and other septicemic diseases of cattle, as well as calf scours, have been treated with success.[95] In the treatment of acute scours in 1- to 3-day-old calves, one intravenous dose of aureomycin appears to be sufficient to overcome the infection in the majority of the cases. Several cases of strangles have been treated successfully with aureomycin administered intravenously.[96]

TABLE 5—Diseases Which Show Promise of Responding to Aureomycin Therapy

Rickettsial infections
Atypical virus pneumonia
Brucellosis (human)
Fowl typhoid
Hemorrhagic septicemia
Swine erysipelas
Psittacosis and ornithosis
Meningococcic infections
Staphylococcic infections
Penicillin-resistant infections due to gram-positive cocci

Aureomycin ointment has been found to be useful in the local treatment of skin infections[97,98] and of infections of eyes and ears in dogs and cats.[98] Data indicating that leptospirosis due to *Leptospira icterohemorrhagiae*[99] and *Leptospira canicola*[100] may be treated successfully with the substance have been presented.

A brief report by Hage[101] indicates that aureomycin is of value in the treatment of feline distempter. He suggests that 50 mg. be given, orally, twice daily.

Limited information would indicate that this antibiotic agent possesses value in the therapy of coccidiosis in dogs.[102] The diarrheal condition improves and the feces have been found to be free of coccidial oöcysts subsequent to treatment.

Dosage forms are: powder for preparation of solutions; powder in capsules, tablets, and ointment are available.

CHLORAMPHENICOL (CHLOROMYCETIN)

Chloromycetin is a crystalline antibiotic substance obtained from cultures of *Streptomyces venezuelae;* it can also be prepared synthetically. This antibiotic-producing culture was isolated by Dr. Paul Burkholder[103] of Yale University. It possesses a wide range of activity against microörganisms, including bacteria, rickettsia, and certain large viruses. Chloromycetin is rapidly and well absorbed from the gastrointestinal tract. The $l.d._{50}$ dose is 245 mg. per kilogram by oral administra-

tion in an acacia suspension for mice.[104] Chloromycetin usually is administered in powder form in capsules to human patients.

Indications and dosage for the use of chloromycetin in animals have not been published.

TERRAMYCIN

Terramycin is produced by *Streptomyces rimosus*. It was first reported by A. C. Finlay.[105] Crystalline terramycin hydrochloride is a bright yellow powder possessing potent antimicrobial activity. It is effective against a wide variety of organisms including many gram-positive and gram-negative bacteria, spirochetes, rickettsia, and certain of the viruses. It has been used effectively in the treatment of many diseases in human patients caused by the above-mentioned types of microörganisms and in addition it has been used with considerable success in the control of amebiasis.

Terramycin is readily absorbed and is well tolerated by human patients.[105-108] It will maintain its potency for at least twelve months when stored at room temperature. It is available in powder form, in capsules, and ointment.

Indications and dosage for the use of terramycin in animals have not been published.

COMBINATIONS OF ANTIBIOTICS

A combination of several antibiotics, especially penicillin and streptomycin or dihydrostreptomycin, are used frequently. The rationale for such combinations is the increase in the antibacterial spectrum of activity. The procedure frequently is followed in the intramammary treatment of bovine mastitis. In many instances it is difficult to know precisely the type of organisms responsible for the infection. Some of the organisms may be sensitive to penicillin while others may be insensitive to this antibiotic but sensitive to streptomycin. Both substances are well tolerated in the mammary gland and are compatible when mixed in various dosage forms for intramammary instillation.

The two antibiotic agents also are used for maintaining the sterility of bovine semen. One milligram of streptomycin and 1,000 units of sodium penicillin added to each milliliter of diluted bovine semen have been found to be very satisfactory for reducing greatly the bacterial flora as compared with that found in untreated control samples.[110] In certain studies, such treatment of semen from bulls that had a poor conception rate has appeared to influence favorably the conception rate. These two agents also are used to control bacterial contamination of virus cultures, which, in laboratory work, is very helpful indeed.

OTHER USES OF ANTIBIOTICS

Within the past year, evidence has been presented that certain antibiotic substances in pure form, when added to the feed of young poultry and swine, increase the growth rate. In this respect streptomycin, aureomycin, and terramycin appear to be particularly interesting. The most pronounced increase in growth of animals so fed is noted early in life; it is less apparent when they reach maturity. The precise mechanism whereby antibiotics cause this effect is not known, but it is assumed that they affect adversely harmful bacteria or favor useful flora in the digestive tract.

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Immediate Effect of the Atomic Bomb on Japanese Army Animals with the Hiroshima Division

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MORI TERUMOTO, a feudal lord, built a castle in Hiroshima City 350 years ago and called it Hiroshima-Jo (Castle on the Wide Island). Later, the name Hiroshima was applied to the city. After the reign of the Mori Terumoto family, the Asano family took over the sovereignty of the district and encouraged industries, thus laying the foundation for the castle city of Hiroshima. In 1868, the restoration of the imperial rule brought an end to the Asano family rule. The municipal system was proclaimed in 1889. The port of Hiroshima and the San-yo railroad line between Kobe and Shimonoseki were also completed in 1889.

During the Sino-Japanese War (1894-1895) the imperial headquarters were in the Hiroshima castle; thus, Hiroshima became an important point of land and water transport and a center of military affairs. Just before the war, Hiroshima City was the seventh largest city in Japan, with a population of 400,000.

The city itself is situated in the southwest part of Honshu, facing the Inland Sea of Seto, and is surrounded by mountain ranges on the other three sides. Branches of the river Ota, which are seven in number, flow through the city to the Inland Sea.

The Moment

A few days prior to the bombing of Hiroshima, American B-29 planes had dropped leaflets announcing to the population that the city would be bombed. The Japanese Army promptly set about collecting the pamphlets and announced it was American propaganda. However, the Japanese Army did remove 385 of its horses from the area.

On Aug. 6, 1945, at 8:15 a.m., the first atomic bomb exploded in the sky over Hiroshima City. From a retreating B-29 estimated by observers to be 1,560 meters above the city, something fell rapidly for a few moments, leaving a big, red column of flame, and then exploded approximately one minute and forty seconds after leaving the bomber at an estimated 570 meters

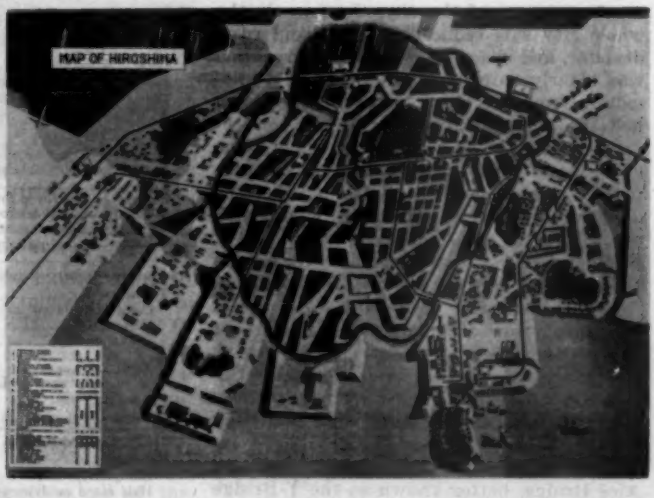

Fig. 1—Forty per cent of Hiroshima was blanketed by flames and fires which laid waste an estimated 333 acres of land within ten minutes.

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above the city. The bomber was estimated to be 16 kilometers* away at the time of the second explosion. The violence of the second explosion was beyond description. Reddish blue and reddish brown flames shot out in every direction, followed by a thunderous explosion and devastating heat

TABLE 1—Density of Population in Hiroshima

Distance from center (in kilometers)	Dec. 1, 1945 (%)	Dec. 1, 1946 (%)
1.0	3.1	28.9
1.5	11.5	32.8
2.0	22.5	54.7
2.5	75.7	117.7
3.0	128.5	182.5
Over 3.0	181.6	211.8

waves. The flames and fire covered 40 per cent of Hiroshima and laid waste an estimated 333 acres of land within ten minutes. A gigantic mountain of radioactive cloud swirled up into the sky. At the epicenter of the target, a fireball of terrific heat, a small sun estimated to be 150 meters in diameter and, by the after-effects noted, about 20,000 F., was seen by observers. The explosive concussion waves reached a distance of 60 kilometers.

Approximately ten minutes after the explosion, a heavy black shower fell in the northwest part of the city, thus nearly the whole city was reduced to ashes and ruin, disaster, and chaos. The city of Hiroshima was utterly ruined and the area of 3 kilometers from the epicenter of the explosion had the appearance of "an atomic desert" (*see* fig. 1). Nobody quite remembers who gave the city this name but it was appropriate. Many people hesitated to enter the destroyed area and left it for wild grass, scrub plants, and whatever would grow. Rumors were circulated that this area would be barren for seventy-five years.

Observers have seen slate and brick melted together, and plate glass rolled under like paper. Tile and granite became grainy and lumpy on the exposed surfaces. Silhouettes of people can be seen on granite in instances where they were standing nearby at the time of the flash.

The epicenter of the explosion was the Aioi Bridge, better known as the T-Bridge (fig. 2). The only solid building at the epicenter was the Industrial Promotion Hall. The old brick building, with its dome, was demolished (fig. 3).

*Roughly computed, 1 kilometer is about ⅝ of a mile.

OUTLINE OF THE DAMAGE

The population at the time of the atomic bomb raid was uncertain, because a great mass of people moved in and out daily to shelter themselves from air raids. The total number of persons was estimated to be 360,251 prior to the bombing.

Human casualities investigated by the Japanese police department and released by the Hiroshima City Hall are as follows:

Dead	78,150
Missing	13,983
Injured	37,425
Total (August, 1945)	129,558
August, 1946	188,119
August, 1947	212,335
August, 1948	246,134

Density of the population in the city is reported in table 1.

One month after the bombing, the city suffered several typhoons and heavy rains. River banks were broken and houses were washed away, adding to the misery.

TABLE 2—Data on Buildings, Bridges, and Transportation

BUILDINGS	
Completely burned or destroyed	61,820
Half burned or destroyed	6,040
Total	67,860
Buildings before the bombing	76,327
Utilizable after the bombing	6,180
Not destroyed	2,287
Total	8,467
BRIDGES	
Burned or destroyed by the bomb	10
Washed away or destroyed by the storm	20
TRANSPORTATION	
Interurban Transportation	
Tramcars	
Completely razed	22
Half razed	3
Slight damage	83
Total	108
Serviceable cars which remained	2
Busses	
Razed	68
Railway Transportation	
Coaches	
Completely razed	6
Half razed or destroyed	84
Total	90
Freight Cars	
Completely razed	41
Half razed or destroyed	5
Half destroyed	19
Total	65

No damage was done to locomotives. Train transportation through Hiroshima, interrupted for three days, was recovered on the fourth day, Aug. 9, 1945.

TABLE 3—Number of Civilian-Owned Animals in Hiroshima, which Died Between Aug. 6 and 15, 1945

Animals	No.
Horses	289
Cattle	173
Swine	52
Dogs	14
Cats	3

STATUS OF ANIMAL POPULATION IN HIROSHIMA

Civilian-Owned Animals.—Records of both large and small animals belonging to the civilian population, which were normally kept by the City Hall, were completely destroyed so that no accurate records are available. However, according to Dr. Fujimoto, now with the Fukuyama Health Center, who treated many of the animals of

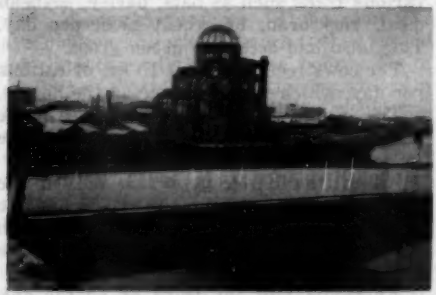

Fig. 2—The epicenter of the explosion was the Aioi Bridge, better known as the T-Bridge. This was the original target area.

the civilian population, the number of civilian-owned animals dying in Hiroshima between Aug. 6 and 15, 1945, is shown in table 3.

Japanese Army Animals.—In compliance with a declaration by the Emperor, the army in Hiroshima was demobilized from Aug. 16, 1945, to the end of September, 1945, amidst confusion, utter destruction, and chaos. During this time, all of the army records not destroyed by the bombing were purposely destroyed after the surrender. For this reason, army records were not available for study. Therefore, former Japanese veterinary officers, who had been directly responsible for the care and handling of the army animals with the Hiroshima Division were searched for. Dr. Matsumoto of the Hiroshima Prefecture Livestock Laboratory, formerly a second lieutenant assigned to the infantry regiment and the communication battalion, supplied the numbers of animals presented in this paper and also the postmortem reports observed in animals during the first month. The number of animals present prior to the bombing and those surviving the atom bomb were verified at separate conferences by Dr. Yamasaki, formerly a first lieutenant with the transportation regiment and Dr. Hirata, formerly a second lieutenant with general headquarters of the Second Corps. Dr. Yamasaki was able to verify data after the bombing, as he took command of the Division and knew the over-all picture. These officers survived the blast because they did not have to report for duty until 10 o'clock that morning.

It is not the intent or purpose of this preliminary report to present data of any kind on the after-effects of the bombing which might be attributable to radiation. Such a report would involve a full-time study and would be a long-range project which the author is unable to carry out at present.

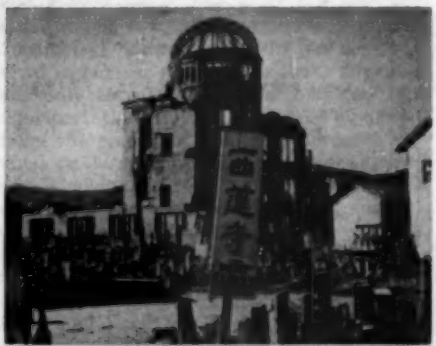

Fig. 3—The Industrial Promotion Hall in the background was demolished. In the foreground was the Sairenji Buddhist temple which is considered the explosive center by the Japanese. It is about 150 meters from the T-Bridge.

Immediate disposition of army animals and the keeping of complete records after the bombing was not possible. Many of

TABLE 4—Survival of Total Army Animal Population at the Different Installations in Hiroshima

Name of outfit	Meters from epicenter	Normally attached (No.)	Horses				Dogs			Swine			Cows			Chickens			Ducks		
			Removed before bombing (No.)	Present at blast (No.)	Killed (No.)	Alive (No.)	Survival (%)	Present at blast (No.)	Killed (No.)	Alive (No.)	Present at blast (No.)	Killed (No.)	Survived (%)	Present at blast (No.)	Killed (No.)	Alive (No.)	Present at blast (No.)	Killed (No.)	Alive (No.)	Present at blast (No.)	Killed (No.)	Alive (No.)	Survived (%)
GHQ of Second Corps	2,000	20	....	20	8	12	60	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
HQ of division	400	25	....	25	21	4	16	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Communication battalion	600	50	30	20	16	4	20	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Infantry reg.	1,100	85	40	45	40	5	11	20	16 (Only 1 week)	4	0	40	40	0	2	2	0	150	60	90	70	60	46	40	50	50	0	0
Artillery reg.	700	300	280	20	15	5	25	....	....	....	50	50	0	....	....	....	....	150	....	....	....	....	....	....	....	....	....	....
Transportation reg.	700	75	35	40	30	10	25	....	....	....	50	5	83	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Engineer reg.	2,300	10	....	10	0	10	100	....	....	....	20	0	100	....	....	....	....	50	0	50	53	53	100	100	....	....	....	....
Noncommission school	1,030	20	....	20	15	5	25	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
First army hospital	900	....	....	....	....	....	....	....	....	....	10	10	0	....	....	....	....	40	40	0	0	0	0	0	....	....	....	....	....
Second army hospital	500	....	....	....	....	....	....	....	....	....	10	0	0	....	....	....	....	40	40	0	40	40	100	100	....	....	....	....	....
Mitaki army hospital	2,400	....	....	....	....	....	....	....	....	....	10	0	100	....	....	....	....	40	0	40	40	40	100	100	....	....	....	....	....
Eba army hospital	3,600	....	....	....	....	....	....	....	....	....	10	10	100	....	....	....	....	40	0	40	40	40	100	100	....	....	....	....	....
HQ water trans.	4,600	20	....	20	0	20	100	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Akabo brig.	700	70	....	70	60	10	14	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
Total		675	385	290	205	85	29	20	16	4	0	160	95	65	<0	2	2	0	510	250	260	50	53	50	0	0	0	0	0

the animals were on loan to the army, and the veterinary officers in charge of a certain outfit returned the animals to their owners. Moreover, farmers in the locality made off with some of the animals. Not until approximately three weeks after the bombing was a board set up in accordance with recommendations by prefectural officials, whereby the remaining animals would be sold to farmers after being released by the army.

The routine feeding schedules were as follows:

1) Horses were fed four times a day at 6:30 a.m., 12:00 noon, 6:00 p.m., and 9:00 p.m.

2) Cows were fed four times a day on the same schedule as the horses.

3) Dogs were fed twice a day at 7:00 a.m. and 6:00 p.m.

4) Chickens and ducks were fed three times a day at 6:30 a.m., 12:00 noon, and 9:00 p.m.

5) Swine were fed at the same time as the chickens and ducks.

The horses received about 3.5 kg. of various feeds such as oats, barley, soybean meal, rice bran, or wheat bran per day. They also had access to green grass.

The cows received about 10 kg. of rations per day, which was the same as the horses.

The swine received garbage. All the animals with the Hiroshima Division were in good nutritional condition.

All of the buildings which housed the animals were of wooden construction. The swine shelter was open on the sides with no walls. A sand pit was available to the swine at all times.

Approximately one third of all the animals were out of doors just prior to the bombing.

Not in evidence today was a canal which surrounded the infantry regiment on the north and west sides. The transportation regiment was located at the bifurcation of the Ota River on its largest branch and about 200 meters away from the canal. The artillery regiment was located between the transportation and infantry regiments, about 400 meters from the canal. The engineering regiment was located about 200 meters from the largest body of the Ota River before it bifurcates. The headquarters division was located approximately 150 meters from the Ota River in the infantry compound. The communication battalion was approximately 150 meters away from the canal. The locations of the

various army outfits are mentioned for information, because it is not known what part large bodies of water may have played in radiation after-effects on animals and contamination by radioactive sprays of water.

Types of injuries which the animals in Hiroshima may have suffered are three in number: (1) mechanical injuries, caused by falling buildings and flying debris; (2) thermal injuries, caused by flash and resulting fires; and (3) injuries caused by dangerous radiation. In Hiroshima, the injuries which may have been caused by radiation were due to the instantaneous discharge rather than persistent radioactivity. Single or any combination of the three types of injuries may have been sustained by the animals. However, it is reasonable to assume that at least one third of the deaths were attributable to thermal burns and flash. Concerning radiation, the *alpha* particles could be stopped by skin, paper, blankets on the animals, harnesses, and wooden enclosures. *Alpha* emitters are, however, a serious hazard if they should get into the interior of the body. There would be no external radiation hazard. On the other hand, *beta* particles would require a ⅛ in. thickness of steel or metal of some kind to prevent its particles from penetrating. Then too, *beta* emitters are a serious external and internal radiation hazard but are considered more serious internally. The third type of radioactivity, called *gamma*, is the most deadly, as it is not a particle, like *alpha* or *beta*, but is a ray of energy so to speak. High energy *gamma* rays require at least 1 ft. of concrete or 3 ft. of earth to stop them and then some may get through. *Gamma* radiation is more serious externally but constitutes an internal, as well as external, hazard.

At the time of the bombing, 8:15 a.m., 290 army horses, 20 army dogs, 160 swine, 2 cows, 510 chickens, and 50 ducks had just completed their feeding. Of the horses, 205 died; 16 army dogs died instantly and the 4 remaining died within a week; 95 swine, 2 cows, 250 chickens, and all 50 of the ducks died. Some of the large animals which were severely burned and survived showed outlines of collars or saddles on their bodies, where they had been shaded from the flash. This is in evidence today. Others which were struck by flying debris had trees and stumps implanted in their bodies.

Headquarters of the Division stables was located only 400 meters from the epicenter of the explosion, yet 16 per cent of the horses survived. The second army hospital was located 500 meters from the epicenter of the explosion and, although the figures are estimates in this case, none of the swine or chickens survived. The battalion communication, which was located 600 meters away, had a 20 per cent survival in horses. The artillery regiment, 700 meters distant, had a 25 per cent survival in horses; none of the swine survived, and only 40 per cent of the chickens. The transportation regiment, located 700 meters from the epicenter, had a 25 per cent survival in horses and 83 per cent survival among swine. The Akaho brigade, which was being formed from reservists and volunteers in the transportation regiment, had a 14 per cent survival of horses. The first army hospital, located 900 meters away, had a 100 per cent mortality among swine and chickens. At the noncommission school, 1,000 meters distant, 25 per cent survival among horses was observed. At 1,100 meters away, the infantry regiment of Hiroshima Division had an 11 per cent survival in horses; all of the army dogs died, as did the swine, cows, and ducks, while 46 per cent of the chickens survived. General headquarters of the Second Corps had a 60 per cent survival among its horses.

Fig. 4—One of the former Japanese army horses which shows epilation and leucoderma. Such cases were also noted in Holstein-Friesian cattle 2,000 to 4,000 meters away.

The engineering regiment, Mitaki Hospital, Eba Hospital, and headquarters water transportation, each of which was located outside of the 2,000-meter radius of the epicenter at 2,300, 2,400, 3,600, and 4,600 meters, respectively, had 100 per cent survival of the 30 horses, 40 swine, and 130 chickens located at these various installations. However, on several dairy farms located in the Kannon Machi area, approximately 4,000 meters away, thermal burns of a superficial nature, with epilation, have been recorded by this observer.

From the total army animal population located at their respective installations, there was a 29 per cent survival in horses, 40 per cent survival among swine, 0 per cent survival among the cows, dogs, and ducks, and a 50 per cent survival among chickens (*see* fig. 4 and table 4).

However, within a 2,000-meter radius from the epicenter, 81 per cent of the horses, 78 per cent of the swine, 66 per cent of the chickens, and 100 per cent of the cattle, dogs, and ducks died from the various types of injuries outlined above.

Former Second Lieutenant Matsumoto established an animal hospital as soon as was practicable at Ushida-cho with the aid of 1 veterinary officer, 1 warrant officer, 2 noncommissioned officers, 3 soldiers, and 20 to 60 fluctuating volunteers.

SYMPTOMS AND POSTMORTEM GROSS PATHOLOGY

*Skin.**—There were sharply demarked flash burn areas, edema, and, later, epilation. Also later, the color of the hair changed from brown or black to light gray and white. It is known that dark objects absorb more heat than light-colored objects.

Localized areas of leucoderma are pathologic, as there is a lack of pigment where it is normally present. The injured epidermal cells become deficient in the enzyme which is active in producing melanin.

Hematomas and ecchymotic hemorrhages which appeared beneath the skin, later caused necrosis of the epidermis, and ulcers developed with resulting epilation. There appeared to be no resistance by the skin to any bacteria which are normally nonpathogenic. The resistance to bacterial contamination, which an animal usually possesses, was lacking. Some of the results may be attributable to soft *gamma* rays.

Heart.—There were epicardial, endocardial, and myocardial petechial hemorrhages. The petechial hemorrhages resembled those seen in hemorrhagic septicemia.

Lungs.—There was edema and some petechial hemorrhage. Later, within a month or so, necrotic areas were noted with hemorrhagic or necrotic pneumonia.

Genito-Urinary.—Petechial hemorrhages of the cortex of the kidneys took place; also, blood was found in the pelvis and ureters of the kidney.

Gastrointestinal Tract.—Very early stages showed edema and widespread swellings; yellowish discolorations; thickening; induration; and later sometimes there were pseudomembranous formations. Gastroenteritis was common. Pigs were noted to vomit yellowish materials.

Spleen.—The spleen was swollen and softened in the early stage; later, it appeared atrophied.

Lymph Nodes.—In the early examinations, the lymph nodes appeared enlarged and pulpy. Later, they appeared shrunken or atrophied.

Bone Marrow.—The bone marrow was blackish or tarry.

Brain.—There were petechial hemorrhages in the brain.

SUMMARY

1) Destruction of Japanese army animals by one or a combination of injuries due to mechanical, thermal, or radiation effects from the Hiroshima atomic bomb airburst, immediately after the bombing and within a three-week-period after the bombing, has been presented. There has been no attempt to attribute death to radiation alone. Moreover, in a preliminary report of this kind, abnormalities, which may have been attributed to radiation, have not been discussed.

2) It is believed that approximately one third of the animals died of flash and thermal injuries within a 2,000 meter radius.

3) From observations and records available, within 2,000 meters from the epicenter of the atom bomb, 100 per cent of the cattle, dogs, and ducks, 81 per cent of the horses,

*The injuries to the skin were due to flash and thermal burns, but gamma rays undoubtedly played a part. Typical radiation pathology, noted in the other organs, may be attributed to beta emitters, although if the alpha emitters or gamma rays entered the body they would cause serious injury.

78 per cent of the swine and 66 per cent of the chickens were destroyed.

4) Beyond the 2,000 meter radius from the epicenter of the atomic bomb, there was 100 per cent survival in all species of animals with the Hiroshima Division.

The Hog Cholera Problem in the United States

PRIOR to the discovery of hog cholera antiserum and hog cholera virus by Dorset, Niles, and McBryde in 1905, hog cholera was a constant danger to all swine herds. About once in each six to eight years, its occurrence reached epizoötic proportions and spread unchecked through a large part of the swine-raising section of the Cornbelt. Since the perfection of serum and of virus, the periodic storms of hog cholera have been less severe and much less destructive. Since 1926, there has not been a major epizoötic of this disease . Widespread epizoötics usually occur during the fall months in years when rainfall and parasites are abundant.

The widespread use of serum and of virus has served to protect individual herds and also to hold in check severe epizoötics, but hog cholera is still widespread and causes greater economic losses than any other disease in the swine industry. Since simultaneous virus is administered in virulent and unattenuated form, it may and often does establish foci of infection in otherwise uninfected neighborhoods. It has also been instrumental in keeping the infection active on many farms.

Because of the fact that there is available an immunizing agent for cholera, most swine raisers and many livestock sanitary officials have given little thought to eradicating the disease. They are content to live with it and take the risk of curtailing losses through vaccination. In this connection, it is significant that no animal disease has been eradicated by vaccination.

Eradication should be the ultimate goal in mind when handling any important animal disease, with vaccination employed as an aid to that end. Hog cholera can be eliminated, as evidenced by its eradication in Canada and the British Isles.

Under farm conditions, excluding freezing temperatures, virus does not live long outside the animal body. Following an outbreak of cholera on a farm, it is generally considered safe to re-stock the premises with susceptible hogs thirty days after the last sick or dead hog has been removed. With this fact in mind, it is believed that if a territory can be kept free from cholera for one year, the disease would automatically die if no new virus is introduced.

Hog cholera virus does not lose its virulency in the face of widespread vaccination.

TABLE I

CRYSTAL-VIOLET VACCINE AND BOYNTON TISSUE VACCINE[1]	SERUM AND VIRUS
Advantages	*Advantages*
1) Do not spread the disease.	1) Produce immediate and permanent immunity in a high percentage of animals.
2) Can be used in debilitated animals.	2) Can be used in cholera-infected and -exposed herds.
3) Do not produce leucopenia.	
4) Produce a comparatively high percentage of immunity.	
5) Can be used in herds affected with chronic diseases (enteritis, chronic pneumonia, etc.)	
6) Cause no immediate vaccination troubles.	
7) Reasonable cost.	
Disadvantages	*Disadvantages*
1) Can not be used in cholera-infected or -exposed herds.	1) Create foci of infection.
2) Do not produce permanent immunity. (Immunity may not last more than twelve months).	2) Produce leucopenia.
3) Do not establish full immunity until twelve or fourteen days following injection.	3) Aggravate dormant infections that may be present in the treated animals.
4) Do not always produce a degree of immunity sufficient to withstand exposure to the virulent virus present in the Cornbelt.	4) Simultaneous virus may be contaminated with pathogenic organisms.
	5) Not all animals vaccinated are immunized.
	6) Higher cost.

[1]Since this report was written, limited licenses have been granted by the BAI, U.S.D.A., for two additional vaccines, one a lapinized product and the other a crystal-violet tissue vaccine.

Based on a report prepared by Dr. C. C. Hastings in 1946 for the Committee on Animal Health, National Academy of Sciences, National Research Council, Division of Biology and Agricultural Board, Washington, D. C.

Neither does the swine population develop any apparent degree of immunity after many years of immunization. It is known that the present method of immunizing swine with hyperimmune serum and virulent virus only protects the individual hog and will not eradicate the disease.

There are two ways to eliminate hog cholera: (1) Destroy all virus; and (2) break the cycle of virus dissemination by immunizing, without the use of virus, the swine population. The former is practically impossible to obtain. The latter is believed to be within the reach of those interested in the swine industry.

During the last few years there have been developed two methods of immunizing swine without the use of virus: crystal-violet hog cholera vaccine and the Boynton tissue vaccine. The former is of blood origin, the latter of tissue origin. Both are similar in their actions. Their advantages and disadvantages as compared with serum and virus are summarized in table 1.

It is the opinion of everyone concerned that hog cholera is the most important disease of swine in the United States. Its cost to the swine industry through death loss and vaccination amounts to an enormous sum each year. Its eradication is much to be desired but will never be accomplished by the methods in use at the present time.

It is believed that hog cholera can be eliminated by the proper application of available procedures. Prior to inaugurating a program on a national scale, there must necessarily be demonstrative projects carried through to successful conclusions in order to prove to the somewhat skeptical public that such a program is practical. A well-outlined program of public education, setting forth the advantages of eradication, must be the first move.

It appears feasible to select an area in which to demonstrate and prove the value of the program adopted. Full confidence and coöperation of the swine owners within the area must be assured. The site selected must contain a reasonably heavy swine population. It should be primarily a breeding territory with a minimum movement of swine from farm to farm, where few if any hogs are brought in from outside sources, especially from sale barns and public stockyards. The use of virus must be prohibited within the area. All swine should be vaccinated with one of the two available non-virulent vaccines. All pigs raised should receive vaccine when 8 weeks of age or soon thereafter. All breeding animals should receive vaccine at least once each year.

If virus should be brought into the demonstration area and cholera should appear, hog cholera antiserum alone could be used for its control. However, the possibility of cholera gaining entrance to the district would be very remote because of the high percentage of immune swine.

By following the above outline, it is believed that a sufficient percentage of the swine population would be immune to break the disease cycle and thus cause the virus to die for want of a susceptible host. If this program proved successful in a small area, it could be extended and eventually cover the entire country.

There is urgent need for an immunizing agent against cholera that will produce a solid immunity and at the same time not endanger untreated animals in the same herd. It is believed that such an agent could be developed. Extensive field research is needed to compare critically the various vaccines and the degree of immunity induced by single and repeated dosages.

A study of the hog cholera situation as it exists in the United States reveals the unpleasant picture that this disease has not received the thorough study and investigation that its economic importance justifies.

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Global Foot-and-Mouth Disease Eradication

Delegates to an international foot-and-mouth disease conference held in Paris on May 13 to 20, 1950, were optimistic about the control of foot-and-mouth disease on a global basis, because, "with existing means and through the implementation of all appropriate and proved measures, it is possible: (a) to protect countries free from infection; (b) to control and eradicate sporadic outbreaks . . .; and (c) to reduce losses, and even eradicate the disease in countries where it exists in an endemic state."—*FAO Bull., July, 1950.*

Physical Concept of the Atom and Nuclear Energy

LIEUTENANT COLONEL JOHN H. RUST, V.C., U.S. ARMY

THE DETONATION of the atomic bomb signalized definite changes in our world. These changes have reached out to encompass every phase of our lives. The veterinary medical profession should analyze its position in this new order. Much has been written of the nature of nuclear energy, but little of it has been in a simple manner available to veterinarians. It is hoped that the following discussion will help clear the field in a moderately nontechnical, particularly nonmathematical, way.

To anyone with some knowledge of physics, chemistry, and mathematics, nuclear energy is not difficult to grasp in a qualitative sense. With such an understanding, the problems related to veterinary medicine are more comprehensible. The veterinarian needs particularly to be informed of the biologic aspects of atomic energy. He should know what to expect from it and how he may deal with it in order to do his part in reducing the seriousness of an atomic disaster. At the same time, he will become aware of the great progress that can be made in the field of veterinary medicine and its related sciences if he uses this new tool.

COMPOSITION OF THE ATOM

The atom is the smallest particle in nature that enters into a chemical reaction. In nature, it varies in size from the hydrogen (H) atom to the uranium (U) atom. In addition, there are four* artificially produced atoms which may have occurred naturally. They are neptunium, plutonium, americium, and curium. They are all heavier than uranium and are radioactive.

The building stones are the protons, neutrons, and electrons. There are other particles and forces, in addition to these building stones, which will be mentioned as the structure of the atom is described. Protons and neutrons form the nucleus of all atoms except hydrogen which has a single proton and no neutrons. About this nucleus revolves the electron, in an orbit not unlike that of our solar system or possibly as a cloud. They are present in the same numbers as there are protons in the nucleus.

The proton (p), or the nucleus of a hydrogen atom, has a single positive charge and weighs 1.0076 in the scale of atomic weights (oxygen=16) or 1 in scale of atomic mass.

The neutron (n), together with a proton, forms the nucleus of deuterium (also called heavy hydrogen, a component of heavy water). In varying combinations, protons and neutrons form the nuclei of all atoms except hydrogen. It is an erroneous but helpful concept to think of the neutron as being a combined proton and electron. In certain situations, neutrons change to protons and emit an electron. The weight of a neutron is slightly more than a proton being 1.0089 in the atomic weight scale; its atomic mass is also considered to be 1. The neutron is of particular interest because of its role in nuclear fission and in the production of radioactive elements.

The electron (*beta* particle) has a small mass which is 1/1,840 that of the proton or 0.00054 in the atomic scale. In most instances, this particle has a negative charge, though some, for a very short period of their life, may have a positive charge (positron) which changes to a negative charge with the emission of a photon. Because of its small mass, the electron's properties are considerably different from the heavier atomic particles. It is easily scattered, can not disturb other electrons within atomic orbits so readily, and it is more responsive to magnetic fields. An electron of high energy moves at a speed approaching that of light. By application of the theory of relativity, it can be determined that an electron having an energy level such that its velocity is nearly that of light will have a mass about 24 times its rest mass. The electron has an important role in roentgen ray production, radio, electricity, elec-

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This is the second of a series of five articles on atomic energy by Colonel Rust.

*Recent announcements by the University of California state that Dr. Glenn T. Seaborg and his associates have isolated elements 97 and 98. They have been given the tentative names of "berkelium" (Bk) and "californium," respectively.

tron microscopes, and many other applied physical fields.

The meson should also be mentioned. At present, little is known about this particle. Possibly, when very high energy cyclotrons are built, it may be found to be of biologic importance. Present concepts are that it may have a positive or negative charge, possesses great mass of about 200, and is very unstable. It is thought to be a means of sharing energy between nuclear particles.

The above mentioned material particles essentially compose the atom. In various combinations, they form the elements. Some are stable, others are not. Together, they compose the world in which we live.

Other Material Particles

The *alpha* particle is the nucleus of the helium atom. It is composed of two neutrons and two protons. The free path of this particle when released from an atom is short and brilliant, causing a great amount of ionization as it goes. It is often used as a missile in cyclotron bombardments where, because of its great mass, it can be more destructive than electrons or neutrons. Its effect upon cells, because of its high ionization density, is important and will be considered in a later phase of this discussion.

The deuteron is the nucleus of the heavy hydrogen or deuterium atom. It is also used as a missile from cyclotrons. Its biologic effects are not important enough to be included in the limited scope of this review.

Nonmaterial Nuclear Radiations

These are referred to variously in literature as particles, radiations, photons, or emissions. Actually, the term radiation or photon is correct. Contrary to what one might think, radiation is not a smooth continuous flow but is broken up into energy packages called photons or quanta. They are defined as electromagnetic radiation of very short wave length and very high frequency originating in the atomic nucleus or K shell. The x-ray may be similar except that it originates with the orbital electrons. Roentgen rays are due to the sudden stopping of high speed electrons which give up their energy as photons. This phenomenon is called "Bremsstrahlung." Think of these rays as belonging to the large family of radiations which include infrared, visible light, and ultraviolet. All obey the same laws, with some explainable exceptions. When photons strike matter, there is an energy exchange. This interaction with matter is important to the biologist for an insight as to what may occur in tissues.

The first and most common occurrence when photons strike matter is the Compton effect. When a *gamma*, for example, strikes a free electron, the electron obeys the ordinary rules of impact just as a billiard ball responds to the full impact of the cue ball. The photon gives up all of its energy to the electron and is lost.

Second, and less important, is the photoelectric effect. When a photon imparts its energy to a loosely held electron within an atom, the energy of the emerging electron is equal to the original energy of the photon less the energy required to free the electron from the atom. The above interactions are the common methods of absorption of lower energy photons.

The third method of interaction is by pair production. When a photon passes near a nucleus it may break up into two electrons, one with a positive (positron) charge, the other negative. The positron, being very unstable, then breaks up into two photons of 500,000 electron volts flying off in opposite directions (annihilation). Pair production increases when photons interact with matter having energies above 1,000,000 electron volts and also increases as the charge of the nucleus increases in the matter with which it is interacting. Its greatest importance is in the problems related to shielding and protective devices. As heavier materials are used, such as lead, the absorption of photons by pair production becomes quite effective and the Compton effect and photoelectric effect less so.

The other nonmaterial nuclear radiation is the neutrino. This radiation has been jokingly referred to as having "no mass, no charge, and no existence." It has been hypothesized to explain the differences of *beta* particles (electrons) radiating from a nucleus. *Beta* particles are electrons originating in the nucleus.

Some additional facts should be mentioned before leaving the subject of particles and ray components of atoms. When *alpha* and *beta* particles and *gamma* rays are arranged in that order, they are in a

decreasing order of mass and absorbability. The range of the *alpha* and *beta* particles is finite and they can be stopped with suitable filters or ample air, but the *gamma* ray has an infinite range and can never be stopped entirely. This of course is, in the practical application, not true because enough filters will cut the detectable range to zero. Protons and deuterons, like the *alpha* particles, have little penetrating power, and their paths have a finite length. The neutron, because of its neutral charge, is difficult to stop and it requires much low atomic weight shielding to reduce its detectable range to zero.

Isotopes

To recapitulate, all atomic nuclei, except hydrogen, are composed of protons and neutrons; the neutron has a mass number of 1 and has no charge; the proton has the same mass number but is positively charged. The chemical or elemental designation of an atom is determined by the total number of charges contained in the nucleus. This is designated the nuclear charge. This nuclear charge always equals the orbital electrons and these, in turn, control the chemical properties of an atom. Therefore, as long as the protons in a nucleus remain constant, the neutrons can be added without alteration of the chemical nature of the atom up to a definite limit. There will be an increase in weight, which may be major in light elements and minor in the heavy elements. These atoms with various numbers of neutrons and the same number of protons are known as isotopes. Hydrogen, to which a neutron is added to its single proton nucleus, increases its mass weight from 1 to 2, a doubling of nuclear weight. The new nucleus is called a deuteron. On the other hand, uranium with 239 mass weight is but slightly heavier than the same element with a mass weight of 238. The atoms containing these nuclei are called isotopes so long as their proton number is the same, no matter how the neutron number may vary.

The exact number of atomic species or isotopes is unknown but is of the order of 1,000. They are of major importance to the biologic sciences. In addition to isotopes, there are isobars which have the same mass weight but a different number of protons and consequently are different atomic specie. Also, there are isomers where the mass weight and the protons and neutrons are the same, but the energy levels differ. Of the first two, there are a goodly number; but of the last, not so many exist for long periods.

Radioactivity

Of the various combinations of nuclei that form the isotopes, some are stable and others unstable. The stable isotopes generally, but not always, are those found in nature. An exception can be found in a naturally occurring radioactive element such as potassium, radium, and uranium, plus many others. Within recent years, four elements have been made artificially. All of these new elements are without stable forms and only exist in unstable states. Their atomic weights are greater than any previously known elements. This has extended our periodic table to 96 elements instead of 92.

As a rule of thumb, it can be stated that there is a gradual increase in the ratio of neutrons to protons in stable isotopes as the atomic weight of such elements increases. As this neutron excess becomes greater, the atom becomes more unstable. Said another way, the probability that the atom will release energy becomes more likely. This release is termed radioactivity. It is a very simple matter for physicists to predict what will happen in a given situation. Carbon has the following stable isotopes: C^{12} and C^{13}. There is no change in the number of protons. There is change, though, by the addition of a neutron, making the following adjustment, C^{14}; it becomes an unstable or radioactive isotope. Now if the stable forms of nitrogen are examined, it will be found that nitrogen has a stable isotope which is an isobar of the last mentioned carbon atom, namely, N^{14}. It appears that nature abhors such a situation, so something must be done to get this atom to a stable state. Therefore, a neutron gives up an electron, changing itself to a proton. This brings about the following reaction:

$$_6C^{14} \longrightarrow {}_7N^{14} + \text{electron.}$$

The negative electron escapes the nucleus and is called a *beta* particle. This is an actual transmutation of an element such as the alchemist sought for centuries—carbon is changed into nitrogen.

The question arises as to why certain atoms are stable and others are not. The term "stable" is a relative one and implies that the isotope in question does not change during the period that the observer is measuring. This statement also should be qualified by these words, "within the sensitivity of present day measuring methods and devices." When a proton (or protons) and a neutron (or neutrons) fuse they give up mass in the form of energy. This can be calculated, and is equal to the binding energy of the nucleus. This change in weight is called the mass defect. If it is divided by the number of nucleons (protons and neutrons) in the nucleus, then the binding energy per nuclear constituent can be calculated by multiplying the results obtained by the square of the speed of light (this is a practical application of Einstein's $E=mc^2$ equation). When this calculation is carried out for all elements, it is found that elements having the greatest binding energy per nucleon are the most stable. Furthermore, elements in the middle of the atomic series are relatively stable, but those at either end of the table are relatively unstable. This is in accord with observations; uranium, radium, radon, etc. we know to be unstable; and, surprisingly enough, hydrogen is also relatively unstable. It is now hypothesized that the heat of the sun is derived from the transmutation of hydrogen into helium.

RADIOACTIVE DECAY

How rapidly and in what manner do the unstable isotopes return to a stable state? As was mentioned before, radioactive decay of an element can happen by (1) a proton to neutron transformation with positron emission (positive *beta* particle or K shell electron), (2) neutron to proton transformation with electron emission (negative *beta* particle), (3) emission of an *alpha* particle (helium nucleus). In addition to these three decay methods, there is also the emission of *gamma* or x-rays; this being a method of energy disposal that permits an atom to return to a more desirable energy level. The emission of *alpha* particles is almost always in the decay of the very heavy elements. Electron and positron emission occurs in the medium heavy and light elements as well as the heavy.

The following is the equation for the radioactive decay of any isotope:

$$N = N_o e^{-\lambda t}$$

Where "N" is the measured number, radioactive emissions of a given amount of matter "N_o" is the original amount, "λ" is the decay constant, and "t" is time. The decay constant is the fraction of radioactive atoms that decay per unit of time. The decay constant for each radioisotope is different.

An analysis of the decay equation reveals a very startling situation. No matter how long the time, a given number of radioactive atoms will never completely decay. Take an extremely large number of coins (just as large as these quantities of atoms) and toss them up at one time. Discard all that show a head. Then toss the remainder, again discarding those showing a head. Keep this process up. This can be continued for a long time since each time the remainder is only halved. If the remainder is always halved, then zero can never be reached. The curve described when these figures are plotted on ordinary graph paper is called an exponential curve. When logarithmic graphs are used, it follows a straight line. The term "exponential decay" is used to describe radioactive decay of atoms, because a straight line on logarithmic paper is called an exponential curve.

In practice, however, those elements with a short half-life, with a rapid decay rate, soon reach a point where present-day measuring devices can not detect them. Then they may be considered as having reached a stable state, for all practical purposes. So far, decay by *alpha* particle (2 protons and neutrons) emission has not been mentioned. Since this particle is a health hazard internally, some attention should be given to it. As the protons in a nucleus increase (atoms with greater atomic number) the repulsive force due to the closeness of many protons, all with a positive charge, becomes greater. This reduces the binding energy so much that an *alpha* particle is very likely to be cast out in the atom's effort to reach a stable state. *Alpha* emission is followed by *beta* emissions in order that the proper ratio of neutrons and protons may be maintained. The process is confined to the very heavy elements, with one exception, and is one of

the methods by which radium and several other heavy radioactive elements decay into radiogenic lead. The path of the emitted *alpha* particle is short. It ends its life as a helium atom by collecting free electrons.

TRANSMUTATIONS

Transmutations are interesting because they are of great importance to students of radiation injuries. In order to understand the examples used, some definitions are needed: "n" is the symbol for neutron; "H" for hydrogen; H^2 for deuteron; "He" for *alpha* particle; "Q" for energy change. Nuclear energy change, called the "Q" value in nuclear transmutation, may be enormously high compared to energy changes of chemical reactions. Superscript numbers are equal to the total protons and neutrons and subscript numbers are the protons only.

Some examples of transmutations follow:

Neutron-induced

$$_{47}Ag^{107} + {}_0n^1 \longrightarrow {}_{47}Ag^{108} + \textit{gamma ray}$$
$$_7N^{14} + {}_0n^1 \longrightarrow {}_6C^{14} + {}_1H^1 + Q$$

Deuteron-induced

$$_{11}Na^{23} + {}_1H^2 \longrightarrow {}_{11}Na^{24} + {}_1H^1 + Q$$
$$_6C^{12} + {}_1H^2 \longrightarrow {}_7N^{13} + {}_0n^1 + Q$$

Alpha particle-induced

$$_5B^{11} + {}_2He^4 \longrightarrow {}_6C^{14} + {}_1H^1 + Q$$
$$_4Be^9 + {}_2He^4 \longrightarrow {}_6C^{12} + {}_0n^1 + Q$$

Proton-induced

$$_6C^{13} + {}_1H^1 \longrightarrow {}_7N^{13} + \textit{gamma ray}$$
$$_8O^{18} + {}_1H^1 \longrightarrow {}_9F^{18} + {}_0n^1 + Q$$

Radiation-induced (photodisintegration)

$$_4Be^9 + \textit{Gamma ray} \longrightarrow {}_4Be^8 + {}_0n^1 + Q$$
$$_1H^2 + \textit{Gamma ray} \longrightarrow {}_1H^1 + {}_0n^1 + Q$$

All of the above equations are balanced both as to atomic number and mass number, much like the balancing of chemical equations. These tables do not include, by any means, all of the possible transmutations but do indicate the nature of such action. It is theoretically possible to make additional types of transmutation reactions, using even larger particles for the induction of transmutation in place of neutrons, deuterons, *alpha* particles, etc., the barrier being our ability to energize larger particles enough to cause a reaction to occur.

An important transmutation occurs in the sun and produces solar heat. This is translated into plant materials on the earth from which we derive so many benefits. It is,

$$_1H^2 + {}_1H^2 \longrightarrow {}_2He^4 + Q$$

FISSION

In a nuclear reaction resulting in a loss or gain of mass, there is a corresponding gain or loss of energy. Einstein's law of mass-energy equivalence. $E=mc^2$, where E is the energy released, m is the loss in mass, and c is the velocity of light, expresses the amount of energy expected when an atom disintegrates. The amount of energy released can be very great. It has been estimated that in a chemical union of 4 Gm. of hydrogen and 32 Gm. of oxygen, the following occurs:

$$^2H_2 + O_2 \longrightarrow 2\ H_2O + 136{,}000\ \text{calories.}$$

But in a nuclear reaction combining 1 Gm. of hydrogen and 7 Gm. of lithium, this will happen:

$$_3Li^7 + {}_1H^1 \longrightarrow 2{}_2H^4 + 5{,}000{,}000{,}000\ \text{calories (Q).}$$

Such an equation as the last is fission and it gives an idea of the magnitude of energy in a nuclear reaction. If the mass on both sides of the equation were to be balanced, it would be found that there has been a loss of mass that equals the energy produced.

There are a few heavy nuclei that have the property of being very unstable when a neutron is added to their nucleus. One of these is an isotope of uranium. When a neutron is added to this element, it violently divides, producing much energy. A possible equation for this reaction is:

$$_{92}U^{235} + {}_0n^1 \rightarrow {}_{46}Pd^{117} + {}_{46}Pd^{117} + {}_0n^1 + {}_0n^1 + Q.$$

The palladium isotope produced is very unstable, having seven more neutrons in its nucleus than the heaviest naturally occurring isotope of this element. The palladium reacts as follows:

$$2{}_{46}Pd^{117} \longrightarrow 2{}_{46}Pd^{110} + 14{}_0N^1 + Q.$$

This reaction is almost simultaneous with the primary. If the total number of neutrons evolved in these two practically simultaneous reactions are free to enter the nucleus of other $_{92}U235$ atoms, we will have not only fission, but a chain reaction as well. Palladium is not the only element produced, since the uranium atom does not

always divide into two equal parts but is distributed among the elements with a mass number of 72-162. This does, however, give some idea as to what happens in an atom bomb or a uranium pile.

INDUCED RADIOACTIVITY

When a neutron strikes a nucleus of an element, it may be captured. If this occurs, it produces a relatively unstable isotope, and such an isotope is considered radioactive. Such a situation can be shown by this equation:

$$_{15}P^{31} + {}_{0}n^{1} \longrightarrow {}_{15}P^{32} + Q.$$

The resultant $_{15}P^{32}$ is radioactive, has a half-life of 14.3 days, and emits *beta* particles as it decays to a stable state. This type of reaction is important biologically, because this radioactive material can be used in tracer studies in physiology, pathology, surgery, and in medicine.

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Notes from the Third Inter-American Congress on Brucellosis*

Isolation of Brucella.—When embryonated hens' eggs had been inoculated by injecting blood clots into them, all three varieties of Brucella have been recovered by Damon and Gay, as reported to the Third Inter-American Congress on Brucellosis.

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The most ardent advocates of the intradermal allergic test underpin their interpretations with the agglutination or opsonocytophagic test, said K. F. Meyer, D. V. M., M.D.

• • •

Bovine infection is characterized by the development of specific agglutinins, complement-fixing antibodies, and an increase in the specific bactericidal activity of the serum.—*D. T. Berman, D.V.M., Wisconsin.*

• • •

The symptoms of brucellosis most frequently observed in swine are abortion, sterility, lameness, orchitis, posterior paralysis, and abscess formation.—*L. M. Hutchings, D.V.M., Ph.D., Indiana.*

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The ring test was positive on approximately nine out of ten herds in which 1 or more infected animals were in production.—*M. H. Roepke, Ph.D., Minnesota.*

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Approximately 1.5 per cent of herds which were completely negative to blood tests were positive to the ring test.—*M. H. Roepke, Ph.D., Minnesota.*

• • •

Organisms surviving the lyophilization process have not sustained any serious physiologic damage so far as vaccine production is concerned.—*Verwey, Harrington, and Matt, Pennsylvania.*

• • •

Major handicaps to nationwide brucellosis eradication include the indifference of the beef industry, and the relatively ineffective control over the movement of infected or exposed livestock.— *W. D. Knox, B.S., Wisconsin.*

Mastitis Treatments Compared.—Cows infected with *Streptococcus agalactiae* were treated in various ways and the following conclusions were drawn (Spencer and Simon, Wisconsin):

1) Bacitracin is ineffective.
2) Aureomycin is no better and is more expensive than penicillin.
3) The sulphone compounds are effective but irritable and toxic.
4) Penicillin is as effective when 25,000 units per quarter are used in a holding or retaining base as when 100,000 units are used.
5) Streptomycin mixed with penicillin is no more effective than penicillin.

*These notes were supplied by Dr. E. P. Johnson, of the Virginia Agricultural Experiment Station, Blacksburg, Va., who was the AVMA official representative at the brucellosis conference.

Epileptiform Manifestations of Endocrine Disturbances Associated with Adrenal Tumors

FRANTISEK KRAL, M.V.D., D.M.V. (h.c.)

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Those of you present at last year's alumni gathering may recall my preliminary report of a mare suffering with epileptiform seizures. At that time, the mare was still living and we had only clinico-therapeutic studies to qualify our diagnosis of an endocrine disturbance as the etiologic agent.

Today, further clinical studies and post-mortem examination being completed, I wish to give a full account of this rare case.

Before discussing the case itself, I will give a brief résumé of epilepsy or epileptiform seizures in animals.

Epilepsy is a paroxysmal and transitory disturbance of the function of the brain, which develops suddenly, ceases spontaneously, and exhibits a conspicuous tendency to recurrence. In its most typical form, it is characterized by sudden loss of consciousness which may or may not be associated with tonic spasm and clonic contractions of the muscles. Many varieties of epileptic attack occur, their distinctive features depending upon differences in the site of origin, extent of involvement, and nature of the disturbance of function. Epilepsy is thus a symptom.

Fundamentally, epilepsy may be divided into two main groups: (1) true, genuine, or idiopathic epilepsy in which no local or general cause can be found. Human beings, and possibly animals, thus affected are regarded as suffering from a predisposition to convulsions. (2) Symptomatic epilepsy or one in which a local or general etiologic factor can be found. Such local causes as intracranial tumor, inflammation, hemorrhage, trauma, and degeneration; or general causes as uremia, intoxication, and metabolic disturbance may produce convulsions or symptomatic epilepsy.

In veterinary medicine, as in human medicine, the etiologic factor of true epilepsy is far from clearly understood. Many cases of true epilepsy have been reported in animals. In most instances, however, complete clinical and pathologic studies have not been made. It seems advisable, therefore, to use the term "epileptic-like," or "epileptiform seizures" in animals.

In veterinary literature, true epilepsy has been described preponderantly in dogs, cattle, and pigs; rarely in cats and birds, although in the latter group it has been described in parrots and turkeys. Apparently, epilepsy is rare in horses. Dexler, a famous animal neuropathologist, saw just 1 case in a horse. Herget, who spent nearly a lifetime in Stud-Branch and examined more than 20,000 mares and 100 stallions, also observed but 1 case.

Some practitioners imply that true epilepsy is a hereditary problem mainly in those animals descended from individuals suffering from chronic brain diseases. Cases are most frequent in purebred animals. La Note observed true epilepsy in two herds of cattle descendant from epileptic bulls. Otto reported 2 epileptic puppies of an epileptic bitch.

Dexler noted that many acute infectious diseases were associated with focal encephalitis, producing a gliosclerosis in cases of recurrent epileptic seizures.

The so-called "reflex-epilepsy" has been seen both in human beings and in animals in connection with various lesions of the skin and mucous membranes, particularly when associated with intestinal parasites.

Epileptic attacks have been provoked in animals by psychic factors such as fright, noise, light, and pain. Gerlach, for instance, had a horse which on a very slight touching of his withers reacted with epileptiform symptoms. In my practice, I observed a dog which was affected with epileptic spells when trains passed by.

Autointoxication has been observed as a cause of epileptic fits during uremia and

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toxemia of pregnancy. In dogs, convulsive attacks have been associated with infection by tapeworms and ascarids.

An exogenous intoxication causing epileptic seizures has been observed after administering sodium carbonate, choline,

Fig. 1—Mare at beginning of epileptic seizure.

and lead (Hahn, Nencki, Pawlow). In human medicine, it is known that convulsant drugs, e.g., cocaine, nicotine, strychnine, magnesium sulfate, and sulfathiazole, are able to provoke epileptic spells.

Of considerable etiologic importance are disorders in secretion of endocrine glands —the thyroid, parathyroid, adrenal, or gonads which also may produce epilepsy-like symptoms.

Epileptic paroxysms may arise either from temporary or permanent abnormal irritation, or by summation of normal physiologic stimuli in the presence of abnormal irritability or hypersensitivity of the cerebral cortex and subcortical centers.

In animals, as in human beings, genuine epilepsy is characterized by sudden attacks which last for a very short time and recur at irregular intervals. The fit generally starts with the pre-epileptic state or the so-called "aura epileptica." The animal appears excited, shakes his head, stretches his neck, and contracts the muscles of the face.

Severe epileptic spells, major epilepsy, the so-called *grand mal*, occurs suddenly and is characterized by trembling and twitching of the skin and skeletal muscles, the nostrils are distended, the animal respires deeply and falls unconscious to the ground. At this moment, all the muscles are in tonic spasm. The neck and the limb muscles, particularly, show tonic spasms interrupted by clonic spasms which usually concern several muscle groups and spread

Fig. 2—Mare at end of epileptic seizure.

rapidly throughout the whole body. The pupils are widely dilated and fixed, the eyes move from side to side and the membrana nictitans covers a considerable part of the eyeball, as in tetanus. The tetanic contraction of the masticatory muscles often causes severe injuries to the tongue. The neck is generally drawn backward and sometimes partially rotated on its long axis. Involuntary evacuation of urine and feces or ejaculation have been observed in dogs. At the beginning of the spell the breathing is, as a rule, suspended but only for a short time, and then becomes very deep. The heart action is accelerated, the mucous membranes are cyanotic.

The duration of an attack varies. It may last from several seconds to an hour. Recovery follows quickly, usually within a few seconds or minutes.

Slight epileptic spells, the so-called *petit mal*, are characterized by mild convulsions which are limited to certain muscles or muscle groups, and often without disturbance of consciousness.

The so-called "epileptiform seizures" have symptoms which are, in the main, identical with those of epilepsy. It is possible, however, to establish signs of some organic lesions which are the primary cause. Such attacks sometimes take the form of Jacksonian epilepsy, in which the spasms begin in a special muscle group and spread gradually to all parts of the

body with or without loss of consciousness.

The course of a true epilepsy is always chronic. Sometimes the spells recur at various intervals, daily, weekly, or even yearly. Proelss reported a horse in which 16 epileptic spells occurred within a day.

The prognosis of a true epilepsy is, in the main, unfavorable. The shorter the intervals, and the more severe the epileptic symptoms, the poorer the prognosis. The outlook is particularly bad in young animals.

The treatment of the epilepsy or epileptic seizures depends upon the nature of the cause. Various narcotics have been employed, and the restriction of salt and protein intake have been recommended. According to Röll, the epileptic attacks sometimes ceased after castration or spaying.

Report of a Case

On March 18, 1948, a gray mare (saddle horse), 14 years old, was brought to our hospital.

About two months previous to hospitalization, the mare had epileptiform convulsions. These apparently occurred only when stimulated. She had had several foals. Her temperature was 100.4 F.; pulse, 52; respiration, 48. On inspection, large fatty swellings were found over the sacrum and in the supraorbital fossa on both sides, causing a visible protrusion of both eyeballs. The crest was much more developed than normal as a typical fatty enlargement. The same fatty swellings were found around the mammae. Excessive sweating over the entire surface of the body was observed.

Respiratory Organs.—On percussion and auscultation, the respiratory organs showed normal conditions; only the breathing was accelerated.

Circulatory Organs.—The heart action was strong, both heart sounds clear, sharp, and strong.

Digestive Organs.—The appetite was good. A desire for water was apparent. The abdomen showed no deviation from normal on palpation, percussion, and auscultation. On rectal examination, cystic enlargement of ovaries, particularly on the right side, was noted. Other abdominal organs revealed no pathologic changes.

Urinalysis (Dr. Boyer).—A urinalysis revealed the following: specific gravity 1,053, reaction alkaline, albumen, acetone negative, indican, sugar, bile negative.

Examination for Blood Sugar.—The examination showed 130.8 mg. of blood sugar per 100 cc. of blood; serum calcium, 12.4 mg./100 cc. of serum; serum phosphorus, 2.6 mg./100 cc. of serum.

Hematologic Examination.—The hematologic examination revealed the following: r.b.c. 6,850,000; w.b.c. 5,550; Hb. 14.3; neutrophils 80 per cent; segmented 28 per cent; nonsegmented 52 per cent; eosinophils 1 per cent; lymphocytes 18 per cent; monocytes 1 per cent.

Feces Flotation.—This examination showed heavy strongyloidosis.

Nervous System.—A moderate degree of hypersensitivity and hyperirritability was present. Skin reflexes were increased. The examination of the psychic function revealed an increase of the mental excitement, characterized by a constant restlessness. The movement and gait were normal.

Ophthalmic Examination (Dr. Deubler).—This examination revealed congestion of the retina; the optic nerve was larger than normal and showed some edema.

Observations and Treatment

No epileptiform convulsions occurred during the entire examination of the mare, as described. But when the twitch was applied, a convulsive fit was produced. The mare first became excited; the eyes had a wild look, and the head was drawn back. At this time, the animal staggered backward, and convulsive movements became apparent (fig. 1). Finally, she fell against the wall on the right side, staggered to the opposite side of the stall, and fell down with her legs thrashing about (fig. 2). She was down only several seconds, without loss of consciousness, then regained her feet, stood staggering for several seconds with feet braced, then resumed a normal attitude. The entire event lasted about two minutes, at the longest. The seizure came on very rapidly, and the mare had no control of herself.

Immediately after the fit, her temperature was 102.2 F.; pulse 80, very hard and strong; respiration, 56.

On March 22, 1948, her temperature was 100.2 F.; pulse, 62; respiration, 40 Epileptiform seizure was induced by applying a twitch.

On the morning of March 25, another convulsive attack occurred when a man entered the stall in which the mare was placed.

On March 28, a similar convulsion was induced by a twitch. This attack was of shorter duration than formerly. The application of the twitch immediately after the first convulsion did not cause a second spell. On the morning of April 4, the mare was in a very excitable state; convulsions, however, could not be produced. The next afternoon, the epileptic seizure occurred, apparently without external stimulus. During that time, the mare showed typical symptoms of estrus.

On April 19, 2.5 cc. of diethylstilbestrol was injected intramuscularly. Ten minutes later, the twitch was applied to her nose, but no fit occurred. However, two days later, the convulsions occurred just as grooming was started. The fit was very strong and lasted about two minutes. Two days later, early morning convulsions were noted without external cause.

On May 12, estrus started again, and on May 17 the mare was going out of estrus. During that time, convulsions were observed three times.

On rectal examination, the right ovary was found greatly enlarged, with several cysts on the surface. The left ovary also was enlarged, and several cysts were noted.

On July 11, diethylstilbestrol was injected again. On July 12, 13, and 18, very strong seizures were induced by noise only. The fits lasted several minutes and after them the mare remained lying down about twelve minutes, entirely exhausted.

The same symptoms occurred on August 1 in the morning, and also two hours later.

On August 8, the mare was spayed (Dr. Churchill). Both ovaries were found enlarged and with many cysts. The right ovary contained 12 cysts, and 51 cc. of yellowish fluid was removed. The left ovary had eight cysts, and 16 cc. of fluid was collected. In both ovaries, the cysts were located superficially and deeply. The fluid from the ovarian cysts was injected intraperitoneally into a guinea pig. During the three weeks of observation, the guinea pig showed no deviation from normal.

During the whole period after the spaying operation, from August 8 until September 25, the mare was apparently calm and no nervousness was observed. No spontaneous fit was established, and no epileptic seizure could be induced as previously described. On September 25, an essential enlargement of the mammary glands was noticed. Also, after an injection of stilbestrol and repeated stimulations, no convulsions were provoked.

On November 1, the mare was delivered to the Bolton farm. Fourteen days later, the mare had several convulsions and was returned to the clinic Jan. 19, 1950. At this time, the horse was much thinner and did not eat normally. On examination, we found that the temperature was 101.8 F.; pulse, 78, strong, hard, regular; respiration, 46. The conjunctivae were congested. The superficial skeletal muscles showed almost continuous nervous tremor when the mare was approached. The eyes protruded, both pupils being dilated to a maximum. Both optic discs were edematous and pale, blood vessels few, with symptoms of papillary atrophy. The mammary glands were very swollen.

The animal moved at a stiff gait and planted the feet heavily when walking. On January 21, when the mare was approached, she became highly nervous; her eyes protruded; the superficial skeletal muscles were markedly trembling; and, finally, she fell on her left side with feet extended in a clonic-tonic manner. There was loss of consciousness. The fit lasted several minutes. Upon recovery, the mare arose and stood quietly, trembling all over. Thirty minutes later, the animal still showed hyperesthesia. After the epileptic seizure, the urine and blood showed no unusual changes: blood sugar, 83.2 mg./100 cc. of blood; serum calcium, 12.8 mg./100 cc. of serum.

The mare was destroyed and an autopsy was performed by Dr. Mills on February 6. On postmortem examination, the right adrenal showed marked enlargement at one end, measuring 7 cm. in diameter and weighing 175 gr. On section, it was grayish yellow, soft, and appeared to involve only the cortex. The left adrenal weighed 12 Gm. and was apparently normal. The brain showed excess fluid. A definite dilatation of all brain ventricles was noted. The spinal cord, with the exception of excess fluid in the sacral region, was normal.

Microscopically, the brain showed changes of a hypertensive encephalopathy. There was marked edema, loss of neurons, especially in the cerebral cortex and cerebellum. There was a reactive gliosis throughout the brain substance. In the subcortical white matter, there were focal areas of demyelinization.

Microscopically, the eye revealed changes of a chronic nature as manifested by demyelinization, gliosis, and loss of retinal ganglion cells (Dr. J. McGrath).

Diagnosis.—The condition was diagnosed as a cortico-adrenal adenoma; acquired hydrocephalus and hypertensive encephalopathy.

Considering the described case from various etiologic standpoints, we can see an essential connection between the clinical manifestations and the defective functioning of the hormonal system. Of course, the whole function of the endocrine system must be considered as a super additive system in which the function of each endocrine organ influences all others, and by each of which the whole endocrine system will be influenced. Every essential disorder of one endocrine organ, therefore, causes a special change in the reactivity of other endocrine organs.

It is well known that the endocrine secretion of the reproductive glands (testicles and ovaries) have a special influence upon the mental and physical development of any organism. In the mare described, we have seen a typical pathologic adiposity, striking by its size and location. Stietz observed the adiposity in a horse with atrophy of the ovaries. The pathologic influence of a disorder of the ovaries upon the central nervous system is well known in many species of animal, particularly as nymphomania in mares and cows. Furthermore, we know that nymphomania is unknown in pregnant and spayed females. In the case of epileptic spells described, no true nymphomania was established. But according to Röll, who described the epileptic spells in horses, the symptom ceased after castration or spaying.

After the postmortem findings of cortical adrenal adenoma, the consideration of the clinical symptoms of the mare turned in another direction. The adrenal cortex produces cortical hormones; the adrenal medulla produces adrenalin. The pathologic changes of adrenal glands may cause either decrease or increase in the hormonal production. With regard to experiences in human medicine, the adrenal cortical adenoma, which occurs very often in aged individuals, involves women about five times more frequently than men. The same is true in aged female dogs. In such cases, the hypercorticalism or hyperadrenia were generally established. It is a condition in which the hormone production of the adrenal cortex is excessively greater than normal. Of course, the adrenal cortex produces a number of hormones with qualitatively different properties. The first proved case of such an adrenal-cortical tumor causing symptoms of adiposity was described by Tilesius in 1803. From other adrenal syndromes, the hyperglycemia, glycosuria, and hypertension with increased blood pressure are, as a rule, present. Also, a pronounced hydrocephalus and an increase of intracranial pressure were described.

In experimental animals, occasional convulsive seizures were produced when cortical hormones, desoxycorticosterone, was injected for a longer time. These nervous fits developed from the formation of periarteritis nodosa in the brain and subsequent encephalopathy.

Furthermore, in cases of adrenalin syndromes, dilatation of the pupils and protrusion of the eyeballs have been observed. When, however, we consider the possibility of hypocorticalism, which causes Addison's disease in human beings, we see that in such adrenocortical deficiencies epileptiform convulsions also may be produced. Whether the described case was a hyperproduction or a deficiency of adrenal hormones can be answered only after repeated urine tests for hormones.

Summarizing the described case, we come to the following conclusion:

The main cause of the repeated epileptiform seizures, adiposity, and hyperglycemia was a hormonal disorder due to an adrenal cortical adenoma which in turn produced a hypertensive encephalopathy.

The latter was of such nature as to account for the recurrent seizures.

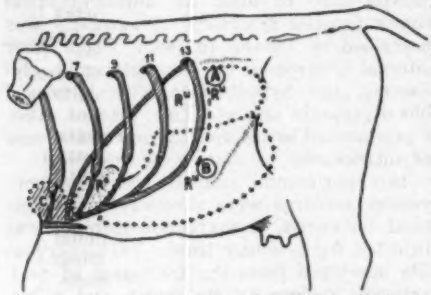
The cystic ovaries may or may not have played a part.

I would, therefore, emphasize that this case is one of symptomatic epilepsy and not true epilepsy.

In the 1941 outbreak of foot-and-mouth disease in Ireland, there was overwhelming evidence of spread of the disease through ingestion, by calves and pigs, of infected skimmilk. Milk from five creameries caused 79 outbreaks, involving at least 289 calves and 59 pigs.—*Irish Vet. J., March, 1950.*

Historic Gastrotomy

The oldest intravisceral intervention of veterinary medicine is the removal of foreign bodies lodged in the reticulum of large ruminants. Marcenac (*Rec. Méd. Vét.*, Oct., 1950) points out that this operation was described by Jean-Baptiste Huzard (Alfort, 1769) in 1808 and by competent clinicians from time to time throughout that century: Tache (1830), Horsburgh (1842), Brogniez (1843), Roche-Lubin (1849), Obich (1864), Bastin (1878), Fischer (1897), to name a few who wrote importantly on the subject. Gustave-Leopold Moussu (Alfort '85), in 1901, was the first to describe the operation from the standpoint of Listerian technique. Among the more recent writers on the subject were Kubits (1922), Hofmann (1926), Gotze (1934), Noesen (1938), and Blendinger (1939), not to mention the fluent Cadiot and his co-workers.



—Courtesy of Recueil de Médecine Vétérinaire

Schematic Surgical Anatomy of Gastrotomy

R'', R'', R''': outlines of the rumen; R', the reticulum; C, the heart; 5', fifth rib; 7, 9, 11, 13, false ribs of these numbers; A to B, the incision. The diagonal drawing between 13 and the xiphoid cartilage shows the relations of the diaphragm to the splanchnic organs involved.

The significance of this historical brief is that the results ranged from bad to mediocre, despite classical technique, because the intervention was undertaken only as a last resort—too late to save life. In short, attempts to remove metallic objects from the reticulum are futile after their migrations have caused purulent complications (abscesses) in adjacent organs (spleen, liver, pericardium). As of 1950, new interest in this daring operation has been aroused through the realization that detecting the presence of foreign bodies in the reticulum, in the light of modern diagnostic methods, need not be postponed until lethal complications have developed.

Management of Vibrionic Abortion.—Where *Vibrio fetus* infection is widespread in self-contained herds kept primarily for milk production, the best approach might be to ignore control in the adult animals, hoping for herd immunity to develop. Meanwhile, the young stock should be artificially inseminated.—*R. W. Hartley, Vet. Rec., July 29, 1950.*

Pregnancy Test in Mares

In connection with the abstract of a paper on this subject (*J.A.V.M.A., 117*, Sept. 1950: 242) our attention is called to the fact that a new diagnostic test for pregnancy of mares was discussed by Dr. F. L. Schweitzer and J. A. Bas in *Gaceta Veterinaria*, vol. *10*, No. 57, pp. 23-28. This report suggested use of the male toad, *Bufo arenarum* Hensel. The method was found 94 per cent effective in 69 cases pregnant for forty to one hundred days.

Breeding Efficiency in Dairy Cattle

The predictability of breeding efficiency of herds was about the same as that for cows. Only 9.3 per cent of the problem herds (2.1 or more services per cow) remain problem herds the following year. Nearly 55 per cent of the cows and 54 per cent of the herds required the same number of services per conception in consecutive years.—*J. Dai. Sci., 33, Oct., 1950.*

Fertilization in Vitro.—Penetration of spermatozoa through the zona pellucida of the rabbit oöcyte and penetration of a single spermatozoon into the oöcyte-cytoplasm have been observed and recorded by Moricard (*Nature*, 1950: 165-763).

Insemination and Conception.—No material difference was observed by Vanderplassche and Paredis (*Tijdschr. Diergeneesk., 74*, 1949) in the percentage of conceptions obtained due to the particular time of insemination. They declare that inseminations made just before the debut of estrual heat should yield the highest possible percentage of calves.

CLINICAL DATA

Clinical Notes

Aureomycin is a promising treatment for *Corynebacterium pyogenes* infections in cattle.—*C. H. Chivers, D.V.M., Iowa.*

Because of considerable lower incidence of allergic manifestations with penicillin O, its use is recommended and may be life-saving in cases showing marked sensitivity to penicillin G.—*Ann. Allergy, May-June, 1950.*

From experiments on sheep and dogs with benzene hexachloride (BHC, technical grade containing 12.5 per cent *gamma* isomer), British workers concluded that "in view of the low concentration of BHC required to control ectoparasites, the chances of a toxic reaction occurring are remote."—*Vet. Rec., July 1, 1950.*

Cattle suffering from stomach worms may be medicated by adding copper sulfate to the drinking water. It is difficult to give a definite formula, but by putting 1 lb. of copper sulfate in the tank, the cattle will refuse to drink it if it is too strong and the proper proportions will probably be reached that way. It should not exceed 1 per cent when given as a drench, and a much smaller proportion can be used in the drinking water.

Louse Control in Farm Animals

Piperonyl butoxide with pyrethrins are highly effective and specific for the control of both sucking and biting lice. This may be applied as a diluted spray or a dip and usual costs will run around 8 cents per animal. At one trial, it was found that hog lice were controlled when piperonyl butoxide, with pyrethrins in oil, were placed on burlap sacking wrapped around a rubbing post in the hog pastures. The lice were completely controlled within three weeks. [Piperonyl butoxide is available under the trade-name of "pyrenone" from the U.S. Industrial Chemicals, Inc., 60 E. 42nd St., New York, N.Y.]

A recessive gene is responsible for prolonged gestation in cows, studies at the University of California indicated.

O'Farrell, of Ireland, reported beneficial results from intramuscular thiamine in bovine catarrhal fever, pointing out that this condition may or not be the same as the malignant catarrhal fever seen in American herds.—*Irish Vet. J., March, 1950.*

Californium, element No. 98, newly discovered in the course of atomic bombardment at the University of California, is the heaviest of the chemical elements. It was blasted from isotope 242 of curium.

Your 1950 Proceedings Book

Members, whose dues are currently paid, will have received before this JOURNAL reaches them, their copy of the "Proceedings Book" which contains the scientific papers and discussions presented at the Miami Beach convention last August. The opening and closing sessions and the business sessions are also reported.

For the first time since 1913, the AVMA is again presenting its members with the complete proceedings of the annual meeting in a single volume. It is a book that is a credit to the Association and the profession—members can be proud to have it in their offices or libraries, and the Association believes it will be a convenient source which will be read and referred to many times.

Because the Executive Board believes that various organizations and libraries which subscribe to the JOURNAL will want to obtain the papers and committee reports, the book is available to such subscribers at $2.00 per copy, postpaid. Nonmember veterinarians and others may obtain the book for $4.00, postpaid.

A Four-Year Study of Listeriosis in Michigan

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IN THE NINETEEN years since Gill[10] showed *Listeria monocytogenes* to be the etiologic agent of circling disease in sheep, listeriosis has become a disease of considerable economic importance.

It has been established that its presence is world-wide; that its hosts are not only sheep, but also cattle (Graham *et al.*[12] Poppensiek,[28] Hatch,[21] Boucher,[2] Cole,[4] Pounden *et al.*,[25] Gray *et al.*,[14,15] Sellers *et al.*,[30] Jensen and Mackey,[26] and Svenkerud[34]); swine (De Blieck and Jansen,[7,8] Graham *et al.*,[12] Kerlin and Graham,[23] Rhoades and Sutherland[29]); goats (Graham *et al.*,[12] Kaplan and Lager,[22] Gifford and Jungherr[9]); dogs (Cox[6] and Chapman[3]); horses (Grini[18] and Svenkerud[34]); chickens (Graham *et al.*,[12] Jansen and Pepperkamp[24]); some forms of wildlife (Lilleengen,[31] Graham *et al.*,[12] Gifford and Jungherr,[9] Jansen and Pepperkamp,[24] Levy,[20] and Morris and Norman[27]); and man (Kaplan,[22] Handelman *et al.*,[19] Harvier *et al.*,[20] Wheeler,[42] and Stanley[33]). Subsequently, it has been reported in sheep by Grini,[17] Graham *et al.*,[12] Spencer *et al.*,[40] Pounden and Edgington,[24] Gray *et al*,[14,15] Ryff and Lee,[27] Stoenner *et al.*,[32] and Viswanathan and Ayyar.[41] There is, as yet, no method of control or adequate treatment of the victims. The next two decades may find it one of the leading killers of livestock.

The presence of this bacterium and listeriosis, the disease caused by it, was first suspected in Michigan by Cheng.[4] He reported a 2-month-old lamb suffering from a disorder of the central nervous system, but did not culture the brain at necropsy. However, histologic sections of the medulla revealed the characteristic "perivascular cuffing." Gray *et al.*[13] confirmed its presence in sheep by isolation and identification of *L. monocytogenes*. This report included 3 ewes and 1 lamb. The ewes exhibited typical encephalitis while the lamb displayed a septicemia. One other ewe showed similar symptoms but Listeria was not isolated.

The following year, Listeria was shown by Gray *et al.*[14] to be present not only in sheep but also in cattle from Michigan. That year, gram-positive bacteria were isolated from 5 cows and 1 ewe. These bacteria were subsequently identified as *L. monocytogenes*. During the winter and spring of 1948, Listeria was isolated from 9 sheep and 9 cows. In a one-month period, from Dec. 15, 1948, to Jan. 15, 1949, Listeria was isolated from 7 cattle. From that date until April 28, 1949, Listeria was isolated from 3 more cows and 17 sheep. The records compiled during this study indicate that this disease has killed at least 104 head of livestock. A killer of food-producing animals such as this, which is also a menace to the health of the owners, warrants a complete study to determine effective methods of diagnosis, mode of transmission, methods of treatment, and a system of control.

METHODS OF ISOLATION FOR DIAGNOSIS

The first attempts to isolate *L. monocytogenes* from suspected material resulted in failure. The technique employed consisted of searing the incised portion of the medulla oblongata at its junction with the spinal cord. A sterile inoculating loop was inserted and the material adhering to the loop after removal was plated on tryptose agar and sheep blood-agar plates. Incubation at 37 C. for periods up to ninety-six hours failed to produce any significant bacterial growth.

With the adoption of a modification of a technique described by Biester and Schwarte,[1] isolation of Listeria was accomplished. This procedure consisted of searing the exposed surfaces of the medulla after removal from the skull. A large portion of this material was placed in a sterile mortar together with 10 to 15 ml. of nutrient broth and ground to a fine pulp. This material was transferred to a sterile bottle containing glass beads and put in a shaking machine for ten to twenty minutes. Approximately 0.5 ml. of the resulting material was plated on tryptose and sheep blood-agar plates. Incubation at 37 C. for eighteen to twenty-four hours produced a heavy growth of Listeria on both mediums.

Both the above described techniques were carried out on the 3 cases of listeriosis in ewes reported by Gray *et al.*[13] In no instance was Listeria isolated when the brain material was not macerated as described above.

When, in the spring of 1947, several bovine brains were submitted to culture for Listeria, the inoculated plates remained sterile. Some of the animals concerned had shown what seemed to be a clinical picture of the disease, yet the causative agent could not be isolated (fig. 1). However, it was found that after the prepared brain suspensions had been refrigerated at 4 C. for varying times, Listeria could be demonstrated by colonies in quantity comparable with those found in sheep

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brain isolations. These original observations were originally reported by Gray *et al.*[15]

Recently, a further modification in technique was made. This consisted in the employment of a Waring blendor with a microhead attachment to macerate the brain material. A portion of the seared medulla was placed in the blendor together with approximately 15 ml. of nutrient broth. This was agitated for three or four minutes. A 0.2-ml. portion was plated on a tryptose agar plate. The incubation time and temperature were the same as above. Except for the economy of time and convenience, the blendor has no particular advantage in sheep brain isolations. However, it would seem that the number of colonies in bovine isolations was increased. To prevent excessive heating, the running time of the blendor should not exceed four minutes unless it has been previously chilled.

In examining the incubated plates for Listeria, a dissecting microscope was employed as described by Huddleson.[25] White light was directed obliquely from below (approximately 45°) through the stage of the microscope. The colonies of Listeria were a bright green with a finely textured surface. This was found to be so characteristic that Listeria colonies can be identified even in cultures with extreme contamination. This may safely be used as a diagnostic technique and was used in all but the first four isolation attempts reported.[15]

By employing these techniques, the isolation of Listeria did not fail in any clinically described case. The diagnoses were substantiated by demonstration of the histopathology in hematoxylin eosin stained sections of the medulla. In listeriosis, a marked perivascular cuffing and areas of focal necrosis were noted. These areas were characterized by both mononuclear and polynuclear cells.

REPORT OF CASES*

Unless otherwise stated, Listeria was isolated from the medulla in each case.

Outbreaks, 1946.—Case 1, March 23, 1946, St. Johns.—A yearling ewe was admitted to the pathology laboratory for diagnosis, March 22. The animal was lethargic and showed rather indefinite symptoms of central nervous system origin. Ketosis was suspected but clinical pathologic tests of the blood and urine revealed no significant change in glucose value and no ketone bodies in the urine. After three days' observation, the animal was slaughtered. At necropsy, the brain showed some congestion. There were no other significant findings.

Case 2, April 4, 1946, East Lansing.—An 8-day-old lamb was presented for necropsy. Listeria was isolated from the liver and heart blood.[16]

Case 3, May 7, 1946, East Lansing.—A 4-year-old ewe was found staggering the morning of May 6. After 250 ml. of glucose was administered intravenously, she seemed no better. The next morning, 200 ml. of saline with 5 per cent glucose were given intraperitoneally. She died the evening of that day. At necropsy, there was an acute bronchopneumonia. The kidneys showed parenchymatous degeneration. There were no other lesions.

Case 4, May 14, 1946, East Lansing.—A 6-year-old ewe was noticed staggering the morning of May 13. She was given 200 ml. of saline with 5 per cent glucose intraperitoneally. Sulfathiazole (210 gr.) was administered orally. Sulfathiazole administration was repeated in the evening. The ewe was found dead the following morning. Necropsy findings were confined to a marked hemorrhagic duodenitis.

Outbreaks, 1947.—Case 5, Feb. 26, 1947, Clare.—A 9-month-old bull was showing symptoms suggestive of listeriosis. It was killed February 26, but cultures prepared from the medulla were negative after twenty-four hours' incubation at 37 C. When the brain suspension, which had been stored in the refrigerator for three months, was again plated, there was a heavy growth of Listeria.

Case 6, March 24, 1947, Kalamazoo.—Three animals in a group of steers died over a six-week period, after showing symptoms of cerebral disturbance. The brain from the third was the only one cultured. This animal began walking in circles and seemed to be blind in the right eye, crowded into the corner of the stall, and showed symptoms of agony. It would go down and had to be helped up each day. At necropsy, the mucous membrane of the fourth stomach showed general congestion. The small intestine showed diffuse congestion and blood-stained contents throughout its entire length. A few petechial hemorrhages were found on the heart. Upon removal of the brain, an excess of cerebrospinal fluid was noted. Examination for rabies was negative.

Case 7, April 5, 1947, Rose Lake.—A 6-month-old heifer was admitted to the veterinary clinic on March 31. The animal began circling to the left the previous day and continued to do so for the next

*Since this manuscript was submitted for publication, Listeria has been isolated from an additional 7 sheep and 8 cows.

five days, after which the heifer was killed for necropsy. Except for congestion of the brain, findings were negative. Cultures prepared from the medulla were badly contaminated and Listeria was not observed. After refrigeration of the brain suspension for two months, it was possible to observe colonies of Listeria among the contaminants.

Case 8, April 15, 1947, Climax.— A yearling heifer was submitted to the veterinary clinic on April 11, 1947. The right ear drooped, the right eye was somewhat inflamed, and the animal circled to the right. The tongue was hanging out, there was excessive salivation, and some twitching of the peripheral muscles. (The owner had lost 1 heifer about a week before, which had shown similar symptoms.) The animal was killed for necropsy. The abomasum showed much congestion and there was marked patchy congestion throughout the small intestine. The lungs and kidneys were mildly congested. There was an excess of cerebral fluid, and the brain was markedly congested. Cultures prepared from the medulla were negative. Three weeks later, it was possible to demonstrate numerous colonies of Listeria from the refrigerated brain suspension.

Case 9, April 24, 1947, Rose Lake.—A yearling ewe which had been kept in the same pen as the heifer in case 7 had shown a tendency to turn her head to the right and to circle. These symptoms persisted for three days, after which the animal was killed for necropsy. The abomasum showed several erosions of the mucosa, the lungs and kidneys showed some congestion, and there was marked congestion of the brain. No other lesions were noted.

Case 10, May 8, 1947, Springport.—On May 3, a 2-year-old cow developed anorexia and difficulty in swallowing and had a temperature of 104.2 F. On May 5, the temperature was 105 F. The tongue was hanging out and there was hay in the mouth. The animal was unable to swallow water. The right eye was inflamed, the right ear drooped, and she circled to the right. The brain was submitted for culture.

Outbreaks, 1948.—Case 11, Dec. 31, 1947, Manchester, Ind.—The head of a 5-year-old cow was submitted for culture. She had been raised on a farm on which no new stock had been brought in. She had shown symptoms of a central nervous disorder and walked in circles. One lip, ear, and eyelid were paralyzed. The temperature was slightly elevated. She lived for six days after these symptoms appeared and became violent before paralysis developed.

Fig. 1—Yearling heifer (case 8). Note position of head, drooping right ear, protruding tongue, and excessive salivation. There is also marked conjunctivitis of right eye. Primary culture of medulla was negative for Listeria.

Case 12, Jan. 9, 1948, Jackson.—The head of a cow was submitted for examination. This was the fourth cow in this herd to show symptoms of a central nervous system disorder. The first died

about three weeks before. The second apparently recovered. The third was killed and the brain sent to the state health laboratory to be checked for rabies. This was reported as being negative.

All the affected animals showed the same symptoms: elevated temperature, protruding eyes, staggering gait, walked in circles, leaned against any stationary object as if unable to stand, and after about four days went down. They all continued eating until they went down.

There were 25 animals of all ages in this lot. All but these 4 were suffering from winter dysentery. No new animals had been brought on this farm in the past two years. One cow on a farm across the road had died after showing similar symptoms.

Case 13, Feb. 2, 1948, Manchester.—A 10-month-old ewe was presented for necropsy. It was the sixth animal in this flock to die. Three others were sick. Symptoms developed rapidly and some died suddenly while others lived for three or four days. At necropsy, the abomasum showed mild congestion. The brain was markedly congested. No other lesions were noted.

Case 14, Feb. 3, 1948, Manchester.—History the same as that of the ewe in case 13. In this 10-month-old wether, no lesions were noted at necropsy, other than congestion of the brain and an excess of cerebral fluid.

Case 15, Feb. 11, 1948, Fenton.—An aged ewe was presented for necropsy. Three other animals had died during the past month. They all staggered, showed a discharge from the nose, and an excessive salivation. They died about twenty-four hours after the onset of symptoms. The abomasum and small intestine throughout its entire length showed congestion. The lungs, kidneys, and brain showed only a mild congestion.

Case 16, Feb. 11, 1948, Fenton.—This sheep was from the same flock as reported in case 15. Only the head was submitted for examination. The brain was badly decomposed.

Case 17, March 11, 1948, Bronson.—The head of a cow which had been shot after showing symptoms of a central nervous system disorder was presented for culture. The bullet was found lodged under the pituitary fossa. There was marked hemorrhage throughout the brain and the meninges.

Case 18, April 9, 1948, Homer.—The head of a cow which showed circling was presented for culture. The brain was markedly congested.

Fig. 2—Ewe (case 34) showing tendency to lean against stationary objects. Note mucopurulent exudate from nostrils, protruding tongue, and snow on the wool indicating that the ewe could not maintain her equilibrium.

Case 19, April 14, 1948, Grand Ledge.—A yearling ewe was presented for necropsy. The day before, she was noticed to circle around the fence, and press into corners. She went down and showed kicking and running motions and died during the night. There were a few hemorrhages in the heart, the lungs were congested, and there was a marked congestion of the brain.

On April 13, the blood picture was: red blood cell count (r.b.c.), 10,000,000; hemoglobin (Hb.), 8.9 Gm. per 100 cc. of blood; white blood cell count (w.b.c.), 8,450; neutrophils, 82; lymphocytes, 16, monocytes, 2.

Case 20, April 21, 1948, Pewamo.—The head of a ewe was presented for culture. All together, the owner had lost 7 ewes. They tended to circle to the right. The

temperature of this ewe just before death was 107.6 F. The brain showed considerable congestion.

Case 21, April 22, 1948, Williamston.—The owner had lost 1 ewe April 20. This 5-year-old ewe began to circle the night of April 21. The head was thrown backward and to one side. She was killed for necropsy. There was some congestion of the abomasum and the brain was slightly congested. No other significant lesions were noted.

The blood picture was: r.b.c., 9,520,000; Hb., 10.1 Gm. per 100 cc. of blood; w.b.c., 14,100; lymphocytes, 3; neutrophils, 79; monocytes, 15; basophils, 3.

Case 22, May 4, 1948, Clarksville.—The owner had lost 2 animals previous to this one. The head of this 2½-month-old ewe lamb was presented for culture. All had shown symptoms of circling to the right. There was hemorrhage around the spinal cord at the base of the brain. No other lesion was noted.

Case 23, May 9, 1948, Laingsburg.—The head of a cow was presented for culture. Before death, the animal seemed to be blind in one eye, showed anorexia and drooling, and the face was paralyzed. The brain was congested and there was an excess of cerebral fluid. A rabies examination was negative.

Case 24, May 24, 1948, Albion.—The head of a yearling bull was presented for culture. The animal had shown twitching of the nose, slobbering, and inability to swallow. The right eye appeared to be turned inward. These symptoms persisted for six days before death.

Case 25, June 21, 1948, Dansville.—The head of a yearling bull was presented for culture. The animal was off feed and showed a pharyngeal paralysis. The head was held down, there was marked salivation, and the animal was weak and staggering. The temperature was 107.0 F. at the onset of symptoms. It had been treated with a sulfonamide and penicillin. Cultures prepared from the medulla were negative for Listeria. When the refrigerated brain suspension was cultured on August 5, there was a heavy growth of Listeria.

Case 26, July 16, 1948, Brown City.—The head of a cow was presented for culture. A clinical diagnosis of rabies had been made. The medulla was cultured for Listeria and the remainder of the brain was sent to the state health department for a rabies examination which was negative.

Outbreaks, 1949.—Case 27, Dec. 17, 1948, Rochester.—The head of a steer showing symptoms of encephalitis was presented for culture. Several other animals in this same herd were showing similar symptoms. The affected animals circled, had a paralysis of the eyelid, and profuse salivation. These symptoms persisted three or four days.

Case 28, Dec. 21, 1948, Mason.—The head of a bull was presented for culture. The animal had difficulty in swallowing, excess salivation, rigid jaw, temperature of 106.0 F., and black diarrhea. The owner reported that the animal had been injured by a rusty nail. Tetanus was suspected. It had been treated with procaine penicillin and tetanus antitoxin. The brain appeared normal.

Case 29, Dec. 21, 1948, Grass Lake.—A cow head was submitted for culture. No history was given.

Case 30, Dec. 23, 1948, Stockbridge.—A 5-year-old cow was presented for necropsy. For two days, she had shown an unsteady gait, and occasionally had gone down. The small intestine was slightly congested throughout. There was one small area of mottling on the liver. The meninges were congested, and there appeared to be a fluid with gas bubbles in the fissure of the brain.

The blood picture was: Hb., 14.3 Gm. per 100 cc. of blood; w.b.c. 10,900; lymphocytes, 39; neutrophils, 41; monocytes, 4; basophils, 1; eosinophils, 15.

Case 31, Jan. 12, 1949, Pewamo.—A yearling bull was presented for necropsy. It was the second with like symptoms to die. Two days previously, the bull was seen to fall against a fence and seemed to be in pain. There was slight pulmonary edema, and the right cerebral hemisphere was congested and edematous.

Case 32, Jan. 14, 1949, Jackson.—A cow head was presented for culture. No history was given.

Case 33, Jan. 14, 1949, Grass Lake.—The head of a 3-year-old heifer was presented for culture. No history was given.

Case 34, Feb. 5, 1949, Charlotte.—One of 2 ewes which had for three days shown symptoms of circling, blindness, and twitching of the peripheral muscles was presented for necropsy. Findings were limited to a congestion of the visceral organs.

The blood picture on February 4 was: r.b.c., 12,790,000; w.b.c., 6,400; lymphocytes, 20; neutrophils, 69; monocytes, 8; basophils, 3.

On February 5, it was: r.b.c. 14,830,000; w.b.c., 2,200; lymphocytes, 25; neutrophils, 68; monocytes, 7.

Case 35, Feb. 11, 1949, Charlotte.—A 2-year-old ewe showed symptoms similar to those in case 34. At necropsy, the small intestine, stomach, lungs, and meninges showed congestion. The lungs were also edematous.

Case 36, Feb. 12, 1949, Charlotte.—This ewe was noticed to be circling in the morning and died that afternoon. Other than areas of congestion in the gastric mucosa, necropsy findings were negative.

Case 37, Feb. 15, 1949, Eaton Rapids.—A 2-year-old ewe which had been circling was presented for necropsy. The small intestine was congested throughout its entire length. The lungs showed an extensive pulmonary edema, and there were hemorrhages in the epicardium. The brain and all visceral organs were mildly congested.

Case 38, Feb. 22, 1949, Ionia.—The head of a ewe which had shown symptoms of a central nervous disorder was presented for culture. One other ewe had died after showing similar symptoms.

Case 39, Feb. 22, 1949, Lansing.—A yearling heifer developed symptoms of a central nervous disturbance on February 17. There was extensive salivation. She walked in a straight line with the head pulled to the left side and extended. The temperature ranged from 101.0 to 104.0 F. She was treated with penicillin and sulfapyridine. At necropsy, there was slight congestion of the ileum, a few hemorrhages in the gastric mucosa, lungs were edematous, kidneys were pulpy and hemorrhagic, and there were numerous hemorrhages on the heart.

The blood count on February 18 was: w.b.c., 9,600; lymphocytes, 37; neutrophils, 56; monocytes, 1; basophils, 1; eosinophils, 5.

Case 40.—Feb. 22, 1949, Romeo.—A cow head was presented for culture. The animal had shown circling, salivation, and difficulty in walking.

Case 41, Feb. 24, 1949, East Lansing.—This ram was found prostrate on February 22. There was a serous discharge from the nose, pupils were dilated, and the head was held to the right and extended, with ears drooped. There were muscular tremors throughout the body, hypersensitivity, and anorexia. The temperature was 100.3 F. It was treated with 175 gr. of sulfapyridine and 200,000 units of penicillin. At necropsy, the small intestine was congested, the lungs showed edema, and there was some gastritis.

The blood picture showed: Hb., 10.8 Gm. per 100 cc. of blood; w.b.c., 13,900; lympho-

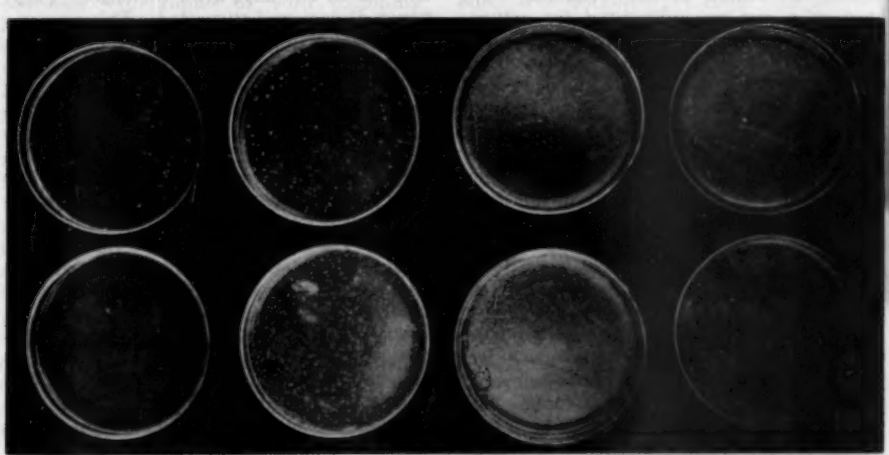

Fig. 3—Typical primary bovine isolation (case 12) and daily increase in colony numbers during an eight-day period of refrigeration of the medulla suspension. In each instance, a 0.2-ml. portion was plated.

cytes, 33; neutrophils, 64; monocytes, 3.

Case 42, March 1, 1949, Ionia.—The head of a ewe was submitted for culture. This ewe was from the same flock as reported for case 38.

Case 43, March 4, 1949, East Lansing.—A yearling ewe from the same flock as case 41 had shown similar symptoms for two days. At necropsy, there was pulmonary edema, numerous adhesions were present between the liver, diaphragm, and intestines, the stomach showed some gastritis, the small intestine was very reddened and showed some mucoid degeneration, the large intestine had some nodular worm lesions, and the kidneys and mesenteric lymph nodes were congested.

The blood picture on March 2 was: Hb., 13.1 Gm. per 100 cc. of blood; w.b.c., 14,050; lymphocytes, 55; neutrophils, 45.

On March 3, it was: Hb., 14.2 Gm. per 100 cc. of blood; w.b.c., 14,000; lymphocytes, 24; neutrophils, 75; monocytes, 1.

Case 44, March 4, 1949, East Lansing.—A 3-year-old ewe was found lying on its back. When placed on its feet it circled to the left. The animal breathed with a marked rattling sound and the upper air passages contained a very heavy mucopurulent exudate. At necropsy, there were no significant lesions.

The blood picture was: Hb., 9.8 Gm. per 100 cc. of blood; w.b.c., 18,300; lymphocytes, 21; neutrophils, 79.

Case 45, March 9, 1949, Okemos.—The head of a cow was presented for culture. The animal had shown an inability to swallow. After five days, it showed loss of the use of the hind quarters and was destroyed.

Case 46, March 14, 1949, Ypsilanti.—A yearling ewe, which had shown symptoms of a central nervous system disorder, was presented for necropsy. Three other lambs had died recently. They all died within one day after symptoms were noted. They circled and pressed their heads against partitions. No gross lesions were found in the yearling ewe examined postmortem.

Case 47, March 15, 1949, Williamston.—A 6-year-old ewe, which had shown signs of a central nervous system disorder, was presented for necropsy. Two other ewes had died showing similar symptoms. This 6-year-old ewe showed no gross lesions at necropsy other than a dull nodular appearance of the meninges. These tiny nodules were yellowish gray and were uniformly distributed. They had the appearance of a suppurative meningitis.

Case 48, March 24, 1949, Charlotte.—A yearling ram was presented for necropsy. It had been circling to the right, the right ear drooped, and there was very marked salivation. It had been treated with sulfathiazole and 400,000 units of penicillin. The small intestine showed numerous scattered areas of congestion and petechial hemorrhages to about the middle of the ileum; here the mucosa became thicker for about 3 ft. and showed no congestion or hemorrhages. The remainder of the ileum was hemorrhagic and congested. The lungs were edematous. There were hemorrhages scattered throughout the heart. Lymph nodes were congested. The large intestine was congested and showed a few petechial hemorrhages.

The blood picture on March 28 was: Hb., 10.8 Gm. per 100 cc. of blood; w.b.c., 17,150; lymphocytes, 34; neutrophils, 64; monocytes, 2.

Case 49, March 31, 1949, Big Rapids.—One of 2 ewes, which had died after showing symptoms of circling was presented for necropsy. Advanced postmortem changes prevented detection of lesions.

Case 50, April 7, 1949, Albion.—A ewe was admitted to the veterinary clinic showing symptoms of a central nervous system disorder. Fourteen other ewes died showing similar symptoms. They lived for only one or two days after the onset. Pregnancy disease was suspected. This ewe was killed and necropsied. There were no gross lesions except that the meninges appeared to be thickened and stippled with minute yellowish foci resembling a suppurative meningitis.

Case 51, April 18, 1949, Romeo.—The head of 1 of 2 rams that had died after showing symptoms of circling for twenty-four hours was submitted for culture. This flock of 160 sheep was crowded into an area sufficiently large for only about 60. No further outbreaks of the disease were reported.

Case 52, April 20, 1949, Manchester.—Two 1-month-old lambs were admitted to the veterinary clinic. They both showed symptoms of circling. They would lean against any stationary object. There was marked salivation, drooping of the ears, strabismus, and terminally prostration. Four ewes in this flock had died since March

15, and 2 other ewes were showing similar symptoms. One of the lambs died April 20. The other was comatose on April 21 and killed. Necropsy findings were negative in each.

Discussion

The case reports revealed that listeriosis was primarily a disease of winter and early spring. Case 26 occurred as late as July 16, and Spencer *et al*[40] reported the appearance of the disease as late as August 10. But in general, the greatest number of outbreaks was reported from January through April.

There were no pathognomonic symptoms nor lesions in listeriosis such as those seen in hog cholera, for example. Symptoms ranged from the so-called "textbook description" to a mere pharyngeal paralysis. The duration of the disease was short in some cases; in others, it extended as long as ten days. This was true in both species studied but generally the course was much shorter in sheep than in cattle.

Listeriosis in sheep could easily be confused with ketosis or with overeating disease. In flocks where these diseases were concurrent, they could be distinguished only at necropsy. The fatty liver found in ketosis and the hemorrhages characteristic of overeating disease were not found in cases of listeriosis.

In cattle, listeriosis was most easily confused with rabies or with poisoning. Some cows became quite violent in the terminal stages. All rabies suspects sent to the laboratory proved to be listeriosis. Several bovine brains sent to the Michigan State Department of Health laboratories for rabies examination were reported to be negative. However, mice inoculated with brain suspensions died of a bacterial septicemia. Although the causative agent was not positively identified, it was thought to be Listeria. In the milder cases, symptoms closely resembled poisoning, but where gastric analyses were performed, no poisons could be demonstrated.

The similarity of the majority of the cases, however, did render certain symptoms characteristic of listeriosis. At the onset of the disease, the infected animal would usually separate itself from the rest of the herd. It would crowd into a corner or lean against a fence or manger as if it were unable to stand unsupported (fig 2). If the animal did walk, it usually moved in a circle, became very depressed, and refused feed. Usually there was some elevation of temperature. A conjunctivitis in one or both eyes developed in some. The head was held back to one side with the ear on that side drooped and there was stringy salivation and a marked discharge from the nose.

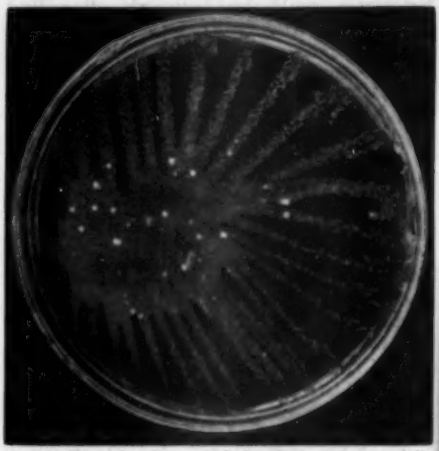

Fig. 4—Typical primary isolation from ovine medulla (case 14).

As far as could be determined, the mortality was near 100 per cent. All affected animals admitted to the veterinary clinic died. However, a few veterinarians reported that some animals suffering with what they had diagnosed as listeriosis recovered. No antemortem isolations were made, so these diagnoses could not be confirmed.

Lesions at necropsy ranged from none to rather extensive damage. As far as could be determined, all but 1 of the cases (case 3) were uncomplicated. A marked enteritis was shown in many cases. It was felt that this lesion may have some significance, but it was not clearly understood. This was also shown in some rabbits artificially exposed. A number of cases were characterized by a marked pulmonary edema, but this too was not consistent.

A number of animals, particularly sheep, were presented for necropsy showing symptoms suggestive of listeriosis. Necropsy

findings failed to establish a diagnosis. Repeated cultures of the medulla, however, failed to reveal the presence of Listeria. Histopathologic examination of the medulla failed to show perivascular cuffing areas of necrosis.

From the foregoing, it was evident that listeriosis could be positively diagnosed only by isolation and identification of *L. monocytogenes*.

In seven of the cases (35, 36, 37, 39, 41, 44, 51), the lungs, spleen, liver, and kidney were cultured. An area from each organ was seared and macerated in the Waring blendor. About 15 ml. of nutrient broth was added to make a suspension. A 0.2-ml. portion was plated on tryptose agar and incubated at 37 C. for twenty-four hours. In no instance was Listeria isolated. Fetuses removed at necropsy from cases 36 and 37 were negative for Listeria following the usual culture procedure.

In 4 cases (43, 44, 46, 50), cultures were prepared from the cerebrum. Listeria was not isolated. The cerebellum was cultured in 2 cases (46, 50). Listeria was isolated in small numbers from both cases. These findings are in accord with those of Spencer *et al.* [40]

Four cases (17, 23, 25, 26), all bovine, showed Listeria in larger numbers in the cervical cord immediately posterior to the medulla than in the medulla itself.

Frequently, conjunctivitis and keratitis accompanied the natural occurrence of the disease. Cultures prepared from conjunctival swabs failed to reveal the presence of Listeria. Saliva and nasal mucus were negative for Listeria. With the exception of case 2, Listeria was not isolated from any source other than the brain.

During the course of this study, several flocks of sheep having active cases of listeriosis, were observed. The exposed animals were bled, but no significant deviation from normal hemocytologic values was evident. Subsequently, in one flock, deaths due to listeriosis occurred at about three- and six-week intervals.

A number of sheep brains from a flock which had an outbreak of listeriosis were cultured. Listeria was not isolated from any of them. The sheep had died of supposedly natural causes or had been slaughtered. Tissue sections of the medulla failed to show lesions. There was no evidence that these animals were carriers or had been exposed to the disease.

The evidence presented by two outbreaks in the spring of 1947 suggested that listeriosis may have a long period of incubation. Two cases, 6 and 8, occurred twenty-two days apart. There was no known direct contact between the two affected herds. However, feeder cattle that had been imported from the same sources in the state of Texas were involved in each outbreak. Numerous other owners had reported that the affected animals, especially in cases involving cattle, had been imported from the southwestern or western feeding ranges. Coupled with this was the fact that, during the four years of this study, the disease had recurred in only one flock of sheep. In only one instance were both sheep and cattle affected on the same premises (cases 7 and 9). In this outbreak, a sheep died from listeriosis nineteen days after a cow had died. Another outbreak (cases 34, 35, 36, 48) occurred where cows were kept in the same barn with the infected sheep. In fact, the infected sheep had access to a box stall shared by cattle. These cattle failed to show symptoms of listeriosis.

Case 50 also was interesting for its epizoötiologic implications. Animals in direct contact became infected, while animals sharing a common feed rack, but not in direct contact, did not show evidence of the disease. This would substantiate the conclusion that listeriosis was not transmitted in this instance by contaminated feed or water. Similar findings are reported by Gill,[11] Paterson,[34] Schwarte and Biester,[38] Graham *et al.*[12] However, Julianelle[26] was able to infect white mice fatally when broth cultures were given as the sole source of fluid intake.

It had not been possible to reproduce listeriosis experimentally except by extremely drastic means such as intracerebral inoculation, intranasal sprays, etc. However, it was shown by Graham *et al.*[12] and Gray *et al.*[15] that the nervous form of listeriosis could follow conjunctival instillation. Graham *et al.*[12] reported that 1 of 2 month-old pigs died eleven days after instillation of culture. There was no conjunctivitis or keratitis. Listeria was recovered from the medulla. Gray *et al.*[15] reported the death of a rabbit twenty-three days following ocular instillation. The

symptoms were suggestive of listeriosis. There were no significant lesions at necropsy and Listeria was isolated only from the medulla. Tissue sections of the medulla showed perivascular cuffing.

TABLE 1—Showing Survival Time of Listeria. All Material Was Sterilized Before Exposure to the Bacterium

Material	Time in weeks
Rabbit pellets (feed)	26
Calf pellets (feed)	16
Hay	16
Straw	6
Wood shaving	6

However, transmission under field conditions could not be established. Cultures of drinking water, straw, feed, litter, etc., from infected premises failed to establish the presence of Listeria in these materials. The nostrils and blood of exposed animals were cultured, with negative results. Until the natural reservoir of this bacterium can be determined, it is unlikely that its epizoötiology can be established.

During the course of this study, it was found that *L. monocytogenes* can survive for long periods under various conditions without loss of pathogenicity. Cultures maintained on blood-agar slants at 4 C. without transfers for three years killed rabbits in less than seventy-two hours following intravenous inoculation. They also produced a marked conjunctivitis in rabbits seventy-two hours after conjunctival instillation. Similar cultures survived at least four months at room temperature. Levy[30] reported that Listeria survived at least three years at room temperature. Medulla suspensions kept at room temperature in this laboratory still contained viable Listeria after nearly four years. Under barn environment, this microörganism could survive for relatively long periods as shown in table 1.

Distilled water suspensions of Listeria (15-50 organisms/ml.) kept at 4 C. were sterile, on an average, after five days for strains isolated from sheep and after nine days for strains isolated from cattle. Similar saline suspensions seldom remained viable for more than twenty-four hours.

SUMMARY

Fifty-two cases of listeriosis, occurring in a four-year period, were reported. In 29 of these, sheep were involved, while cattle were involved in 23. The known losses totaled more than 104 animals of both species. Certain aspects of the epizoötiology of the disease are discussed.

Several techniques were presented for the successful isolation of the bacterium from both species of animals. A method of readily identifying colonies of *Listeria monocytogenes* was described.

The survival of Listeria under various conditions was presented.

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Bovine Fetal Synarthrophysis

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A 4-year-old Shorthorn-Hereford cow was presented to the Large Animal Clinic of the School of Veterinary Medicine at Colorado A. & M. College on Dec. 21, 1950, with a history of having begun labor four hours previously. The owner declared that it was a breech presentation, even though the tail was not visible. On further questioning, he said that he could not deliver the hind legs because they were stiff.

After necessary preparation, exploration revealed ankylosis (fetal synarthrophysis) of both hind limbs involving the hips, stifles, and hocks. There was outward rotation of both stifles. The position of the hind limbs was the cause of the dystocia. Each leg was amputated just below the stifle with a fetatome. When the first leg was severed, arterial hemorrhage was observed. The operator checked for inflicted lacerations, but none were found. The fetus was viable. Following the removal of the other limb, the exposed bone stumps were covered manually and the fetus was easily delivered.

The uterus was again explored and another fetus was present in the same gravid horn. The amnionic sac was ruptured and a normal fetus delivered. Both heifer calves were alive.

The only veterinary reference[1] to ankylosis states the cause to be a diseased embryo or fetus. The question is raised as to whether this condition developed because of lengthy pressure fixation of the hind limbs from inadequate room for normal fetal movement in the uterus.

Distinct muscular atrophy existed in both hind limbs, with a comparative lack of development of the vascular system.

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The Hematologic Examination of the Blood of Sheep Under Physiologic and Pathologic Conditions

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THE DEMAND for more accurate diagnosis can best be met by a more intelligent interpretation not only of subjective and objective symptoms, but also by recognizing and interpreting the obscure or occult symptoms by means of special clinical and laboratory tests.

The primary value of clinical laboratory tests is not to aid in diagnosis, but for use as a guide for the treatment after the diagnosis is made.

The animals used in this study were 16 sheep from the animal breeding and the animal feeding sections in the Faculty of Agriculture, as follows: (1) Ten pregnant ewes were examined at monthly intervals during pregnancy; (2) 1 ewe with mastitis was examined periodically until its recovery; (3) 5 sheep with intestinal helminthiasis were examined.

For comparison, table 1 will summarize a previous paper on the hematologic examination of normal blood of Egyptian sheep.

Blood specimens were collected from the marginal vein of the ear. Blood films were stained by the panoptic method, using May-Gruenwald stain followed by Giemsa stain. They were examined for morphology and differential counts of leucocytes. For the total counts, a Neubauer hemocytometer was used. Determination of hemoglobin was made with the Sahli hemoglobinometer.

PHYSIOLOGIC CONDITIONS

The blood elements undergo various changes during pregnancy. Samples of blood were taken from 10 ewes at monthly intervals from the beginning until completion of the period of gestation.

The red cell count (r.b.c.) was within the normal range during the first stage of pregnancy but gradually decreased in the fifth month.

The hemoglobin percentage (Hb.) varied directly with the red cell count throughout the pregnancy.

The white cell count (w.b.c.) was within the normal range during the early stages of pregnancy. Leucocytosis was noted at the first month.

The differential count showed a slight increase in the neutrophils during the last month of pregnancy. The eosinophils showed a slight increase throughout the whole period; basophils were totally absent in the majority of examinations; lymphocytes showed a slight decrease when the neutrophils tended to be high in the last month of pregnancy; and monocytes were more or less constant throughout the period.

Cohnstein[1] found an average of 9,742,000 r.b.c. and 7.8 Gm. of Hb. in 7 pregnant sheep, and an average of 12,090,000 r.b.c. and 5.5 Gm. of Hb. in 5 nonpregnant sheep.

Storch[2] found only a slight increase in a small percentage of the pregnant sheep examined.

PATHOLOGIC CONDITIONS

Pyogenic Infection.—Serial examinations were recorded in a 3-year-old ewe, suffering from mastitis, from the time of the onset of the disease until recovery.

The red cell count was within the normal range—9,080,000 at the beginning of the disease, falling to 6,170,000. When the animal showed a tendency toward convalescence, the count showed a gradual increase, recording 6,860,000, 7,450,000, and 8,200,000 for the third, fourth, and fifth examinations, respectively, and at recovery 8,980,000 or within the normal range.

The hemoglobin percentage began with 54, the lowest was 51 on the fourth examination, and the highest was 60 on recovery.

The white cell count began with 12,200, then decreased on the second examination to 10,600, and was almost unchanged on the third examination. The fourth and fifth samples recorded slight leucocytosis; the count was 10,800 and 11,000, respectively.

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On recovery, the count was 8,500 or within the normal range.

In the differential count, neutrophilia was indicated by the presence of high percentages of polymorphonuclear leucocytes in five serial examinations during the disease, recording 74.0, 68.0, 62.0, 56.5, and 51.0 per cent respectively. On recovery, the percentage was lowered to 42.0 for the seventh sample. The lymphocytes recorded 21.5, 30.0, 33.5, 37.2, and 44.0 for the five serial examinations, and 52.0 per cent on recovery—all within the normal range. The eosinophils recorded 2.5, 0, 1.5, 3.2, and 3.0 for the five examinations, and 4.8 per cent on recovery, an increase to the normal range. The basophils were generally absent during the disease and on recovery. The monocytes recorded 2.0, 1.2, 3.0, 2.5, and 2.0 for the five examinations, with 2.5 per cent on recovery.

Holman[3] reported a case of gangrenous mastitis in a sheep. The blood count was recorded as follows: r.b.c., 10,400,000; w.b.c., 14,000; Hb., 11 Gm.; neutrophils, 47; eosinophils, 2; basophils, 1; lymphocytes, 45; monocytes, 2.

Intestinal Helminthiasis.—In the 5 sheep which showed parasitic eggs in the feces, the red blood cell count was within the normal range in 2 cases (ave. 9,340,000). In the other 3 cases, the red cell count was within the minimum limit of the normal

TABLE 1—Summary of a Previous Paper on the Hematologic Examination of Normal Blood of Egyptian Sheep

Groups of animals	r.b.c. (millions)	w.b.c.	Hb. (%)	Neut.	Eos.	Bas.	Lym.	Mon.
Newborn lambs	10.930	10,000	70.5	64.5	0.2	0.1	44.0	1.2
Lambs	10.598	8,500	72.0	39.0	2.5	0.5	55.0	3.0
Young sheep	9.735	9,200	62.5	43.0	4.0	0.2	48.5	4.3
Adult sheep	8.585	8,000	54.0	41.0	5.7	0.3	50.0	3.0

count (8,080,000). The hemoglobin percentage showed little deviation from the normal, ranging between 59.4 and 51.2 with an average of 55.0 per cent. The white cell count showed a slight increase in 2 cases (ave. 11,500). In the others, the count averaged 14,250.

In the differential count, the neutrophils ranged between 52 and 43 per cent (ave. 47%), a slight increase in the normal count. The eosinophils ranged between 7.5 and 13.0 (ave. 10%). A marked eosinophilia was present in all cases. The basophils were absent, except in 1 case which recorded 0.3 per cent. The lymphocytes

TABLE 2—Blood Picture During Pregnancy

Month	r.b.c. (millions)	w.b.c.	Hb. (%)	Neut.	Eos.	Bas.	Lym.	Mon.
1	9.190	9,600	57	41.5	2.3	0.2	54.0	2.0
2	10.590	8,300	65	40.5	3.0	0.5	53.0	3.0
3	10.380	7,000	63	39.7	4.2	0.1	54.0	2.0
4	8.460	8,100	63	42.0	4.5	—	50.5	3.0
5	5.740	10,500	52	56.0	8.5	0.2	46.0	2.0

ranged between 32 and 53 per cent (ave. 42%), slightly below the normal. The monocytes showed practically no change.

Table 3 shows the blood count of parasitized sheep recorded by Holman.[3]

TABLE 3—Blood Count of Parasitized Sheep

Disease	r.b.c.	w.b.c.	Hb.	Neut.	Eos.	Bas.	Lym.	Mon.
Stomach worms	9.5	8.6	8.3 Gm.	51	0	0	40	6
Intestinal worms	14.5	10.5	13.8 Gm.	46	1	0	48	4

SUMMARY

Physiologic Conditions.—(1) Serial blood examinations of 10 sheep were observed at monthly intervals during pregnancy. (2) The red cell count showed a tendency to decrease late in gestation. (3) The hemoglobin percentage followed the rise and fall in the red cell count. (4) A leucocytosis was noted at the last month of pregnancy. (5) There was a slight neutrophilia during the last month of pregnancy. (6) A slight eosinophilia was observed throughout the period. (7) The basophils and the monocytes were more or less constant. (8) The lymphocytes showed a slight decrease when the neutrophils tended to be high. (9) Pregnancy could not be diagnosed by any change in the blood picture. (10) Findings recorded are in close agreement with those of other investigators.

Pathologic Conditions.—(1) The red cell count fell during mastitis but returned to normal on recovery. (2) Leucocytosis and neutrophilia developed during the pyogenic infection (mastitis). (3) There was a slight increase in the white cell count and a marked eosinophilia in intestinal helminthiasis. (4) The other counts were more or less constant. (5) Findings recorded are in close agreement with those of other investigators.

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Cortisone Treatment in a Dog

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A 10-year-old, 25-lb., castrated Wire-Haired Fox Terrier was presented to the hospital for examination, with the chief symptom described by the owner as inability to walk upstairs. The owner had noticed for several weeks that the dog was less active and his disposition was also less agreeable, especially when young children attempted to play with him. Stiffness of the legs, inability or lack of desire to jump up on, or down from, chairs and a desire to sleep more were related. When the dog refused to climb the stairs to the house one morning, medical aid was deemed necessary. The dog was kept in the hospital for observation. The temperature was within normal limits, and the appetite and fleshing good. The urine revealed the presence of albumen and the dog demonstrated annoyance when the legs, especially the right hind leg, were manipulated. The second day in the hospital, the right hind leg was not used at all and the dog began to lick and bite the tarsal joints. There was complete disuse of the leg for the next six days and the biting and licking of the leg joints increased. A diagnosis of rheumatoid arthritis was made.

Symptomatic treatment, consisting of salicylates, B-complex, male hormones, and urinary antiseptics, was instituted on the day of entry and continued for a week. At this time, it was deemed advisable to institute a course of cortisone acetate (cortone, Merck). An initial intramuscular injection of 50 mg. (2 cc.) was given. Nausea and vomiting followed in thirty minutes. The following day, a single injection of 25 mg. was given with no untoward effects noted. Daily injections were given and on the fourth day the right hind leg was used but with a decided limp. On the sixth day that cortone was administered, no limp or stiffness were observed. The dog had stopped licking his joints and showed remarkable improvement in disposition and alertness. The medication was discontinued after eight days, and the dog was discharged.

There have been no signs of relapse in the eight weeks since discontinuing treatment, and the owner reports that the dog is acting more lively and spry than at any time in the last two or three years. The only medication used was cortone (Merck).

From the Misener Animal Hospital, Chicago, Ill. Dr. Stanton is now a captain in the Veterinary Corps and is attending the Meat and Dairy Hygiene School in Chicago. Later, he will be stationed at Des Moines, Iowa.

Blackhead in Turkeys

Outbreaks of enterohepatitis probably do not occur under farm conditions unless susceptible poults ingest embryonated eggs of cecal worms from carrier birds, according to W. E. Swales in the *Canadian Journal of Comparative Medicine and Veterinary Science* (Sept., 1950).

Parasites in Colts

Infections with ascaris and strongyles were found to be just as dangerous in yearlings as in sucklings and weanlings. Moreover, no method of animal management or hygiene practice now in use has proved itself sufficient to control worm infection. The only way that these parasitic infections can now be controlled is by the use of efficient anthelmintics.—*Todd et al., Bull. 546, Kentucky Agric. Exper. Sta.*

Esophagic Ausculation of the Heart

A technique which utilizes an ordinary rubber stomach tube to auscultate the heart through the esophagus is described by L. Ozegovic (*Vet. Arhiv., 20,* 1950). The author describes, in an English summary, the technique used and indicates that it is possible to hear the systolic murmur which results from incompetence of the tricuspid valve and of the bicuspid valve in the dog and in the horse.

NUTRITION

Nutritional Aspects of Resistance

(Continued from March JOURNAL)

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Nutrition and Gastrointestinal Motility

Mechanism.—The absorption of food from the intestine depends largely on the condition of the mucosa and the amount of mucosal surface in contact with the food.

Retarded motility of the food limits the amount of absorptive mucosa and, thus, reduces food elements available for nutrition (May, *et al.*[39]). It should be noted that hypermotility also limits the absorption rate by allowing too little time for absorption.

Factors that interfere with absorption are: gastrointestinal disease associated with hypermotility; or reduction of absorbing surface as in diarrhea (Jolliffe[41]) and in *Giardia lamblia* infection (Vegheli[42]).

Protein and General Nutrition.—Golden[32] noted a retarded emptying time of the stomach in well-marked primary nutritional disorders.

Barden *et al.*[4] noted that the emptying time of the small intestine in man and dog is markedly prolonged in definite hypoproteinemia. He also noted anatomic changes.

Ravdin *et al.*[43] found that the movement of food through the small intestine was retarded, as was the absorption of food in human beings with hypoproteinemia. The same effect in the stomach was seen by Jones and Eaton,[47] and Mecray *et al.*[34]

Vitamins.—Dalldorf and Kellogg[22] offered evidence that a lack of vitamin B may seriously impair the mucosa of the intestine in addition to retarding normal activity in rats.

Lepore and Golden[31] reported x-ray evidence of characteristic small intestinal lesions (which recovered after B complex therapy) and impaired absorption due to disturbances of motility in some cases of deficiency disease.

Crandall *et al.*[10] noted a marked therapeutic effect of nicotinic acid but warned that the rest of the B complex vitamins must be considered. The pellagra-preventative factor, nicotinic acid, nicotinamide, or any carboxypyridine derivative capable of replacing these in the diet is essential to normal gastrointestinal motility, and its absence leads to motor dysfunction prior to appearance of usual accepted deficiency symptoms.

Alvarez and Hosoi[1] showed that irritation of any point in the bowel tends to slow progress of material coming from the stomach and hasten the process moving (caudad) away from it. This is known as "Alvarez' law."

Larsh[28] delayed the normal intestinal emptying time of mice with morphine sulfate which tended to show that this retardation increased the number of rats infected by cysticercoids of Hymenolepis.

Larsh and Hendricks[29] described a distinct difference in the localization of adult *Trichinella spiralis* in young and old mice. This difference was ascribed to the intestinal emptying time. Young mice were more rapid and, therefore, adult worms were located farther down in the intestine.

It can be seen that any factor which alters the motility of the intestines can have an effect on resistance, either by hindering the absorption of foods or by favoring the establishment of the parasite by slowing its passage through the intestine and allowing more time for attachment of the parasite.

Nutrition and the Mucosa

Protein and General Nutrition.—Hoelzel and Da Costa[20] suggested that protein deficiency, or a lack of sufficient acid-binding protein in the diet, may be a factor in the etiology of gastric or duodenal ulcer.

Golden[32] stated that if the serum protein reaches the edema level (about 5.5), disturbances in the intestinal pattern occur which are promptly relieved if the serum protein is raised.

Cannon[7] said that severely malnourished human beings have edema of the stomach wall and small intestine and that an edematous gastrointestinal tract does not function normally.

Krause and Crilly[26] demonstrated roentgenologic changes of the small intestine in the presence of hookworms which resembled those of nutritional deficiencies. They expressed the opinion that, although the hookworm did produce irreversible changes, the hookworm's damage was probably not the determining factor but that two factors were responsible: (1) local, (2) systemic (dietary).

Vitamins.—Sullivan and Manville[37] found changes in the "lysozyme" production of the intestinal epithelium. Lysozyme is a bactericidal

factor found in many body fluids. It was noted that while the lysozyme content of the bowel wall was increased, the secreted lysozyme was greatly reduced in amount during a vitamin A deficiency. Also, the Kupffer cells of the liver became swollen and degenerate which suggests that part of the effect of vitamin A deficiency on disease is due to this involvement of the reticulo-endothelial system.

Mellanby and Green[16] noted frequent association of inflammatory lesions with rat avitaminosis, and epithelial metaplasia was present—probably produced by the infection. Later work showed that the metaplasia was a primary effect of deficiency and permitted microörganisms to penetrate. The vitamin A seemed to "preserve" the normal cellular barrier.

Clausen[17] mentioned the effects of vitamin A deficiency on mucous membrane as being drying and deteriorating, incident to keratinization. A histologic examination of ducts of the sublingual gland, sebaceous gland of the skin, and lachrimal gland of the eyes, showed the passages choked with masses of dead cells.

The mucous membrane is easily affected by a shortage of vitamin A; depleted rats have weight loss, diarrhea, and other signs of gastric disturbance (Clausen[17]). Blackfan and Wolback[2] cited M. B. Richards who found that rats deprived of vitamin A had roughened mucosa, clogged ducts, and lacked normal moisture. This led to inflammation of the whole intestinal tract and marked alteration of the stomach mucosa—pitting, hemorrhages, and actual ulceration.

Roe and Dyer[71] found that the effect of nutrition on the gastric function of man and rat was very much alike.

Rao[61] noted that monkeys fed diets poor in vitamins A, C, B complex, and calcium soon failed to gain, became listless, and had chronic diarrhea. In the early stages, protective foods could halt the diarrhea, but later nothing could, and death resulted. The small intestine had severe noninflammatory degeneration but the lesions were *not shared by the large intestine.* The jejunum and ileum were edematous, lined with a thick layer of mucus, and showed varying degrees of atrophy—more marked in the lower ileum—and the muscular layer was atrophic. In the longest surviving monkeys, the intestinal villi were almost acellular with the covering epithelium lost (withering villi).

Heublin *et al.*[39] described disturbances of the small intestine as a result of vitamin B deficiency in dogs. In well advanced nutritional disorders, there was atrophy of the intestinal wall, gross thinning, irregular dilatation, ulcers, perforation, and congestion with hemorrhages into the mucous membrane and lumen. The mucosa showed atrophy, with either obliteration or exaggeration of the mucosal folds, edema, and villi were shortened or obliterated.

Nutritional disorders may be the result of insufficient ingestion, disturbed digestive processes, incomplete absorption, or improper utilization after absorption, or a "vicious cycle."

Miscellaneous.—Frick and Ackert[29] found that the duodenal mucosa of older chickens secreted mucus which varied from that of young chickens and was effective against *Ascaridia galli.* The effect of this mucus seemed to be on the worm's nutrition and was temporary in nature.

It seems plausible that diet might have some effect on the goblet cells in the mucosa and affect their secretion and its quality.

Zucker and Berg[78] reported that a specific calcium deficiency could produce nutritional gastritis in the rat. This was a new manifestation of calcium deficiency.

Friedman[26] suggested that effect of nutritional deficiency be investigated from the standpoint of the life cycle of intestinal epithelial cells. He also suggested that some gastrointestinal disturbances, known to occur in spontaneous and experimental vitamin deficiency, might be explained in terms of aberrations in cellular replacement of the intestinal mucosa.

Summary and Conclusions

An adequate supply of protein is essential for resistance to disease. It is needed for production of protective antibodies, cellular elements, and also for the maintenance of intestinal motility and the mucosal structure. Low protein levels cause edema and hypomotility of the small intestine which considerably affect food absorption and local tissue resistance to infection. High levels appear to discourage intestinal parasites. Carbohydrates, on the other hand, tend to favor intestinal parasites.

Vitamins vary in their effect. Vitamin A is necessary for the epithelial cells which form an important local protective barrier against infection. Deficiencies of the vitamin B group interfere with bone marrow production of phagocytes, impair the mucosa, retard intestinal motility, and have a marked lowering effect on resistance. Vitamin C deficiency (scurvy) and decreased resistance seem to be associated to a considerable degree. Vitamin D apparently has very little effect on resistance.

The role of the intestinal mucosa and intestinal motility in resistance appears to be very important. It has been suggested that the mechanics of epithelial cell replacement might be further investigated to advantage. The effect of hormones is another aspect that might well be considered. Nutrition is an important factor in resistance to disease.

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Nutrition and Animal Health

The importance of proper nutrition in the maintenance of health, resistance to disease, and recovery from disease conditions is fully recognized and should take its place along with sanitation, hygienic measures, and other principles which contribute to the maintenance of health of animals.

When pathogenic organisms successfully invade animal tissues, those individuals being fed the most complete rations will withstand the disease longer and will recover more rapidly than those incompletely nourished.

In calculating rations for farm animals, the purpose for which the animals are being kept must be considered. For example, the requirements differ for growth, maintenance, fattening, reproduction, production of eggs or milk, work in the case of the farm horses, and various other purposes.

Veterinarians should be able to advise their clients about good feeding practices, says Dr. M. J. Swenson in "What a Veterinarian Should Know About Nutrition" (*Iowa State College Vet.*, 1950). He outlines briefly and practically the points which a veterinarian could use in his daily contact with animal owners to improve the relationship between his professional call and the economic production of livestock and animal food products.

Thyroprotein Feeding in Midsummer

The efficiency of using total digestible nutrients was 69 per cent for cows fed thyroprotein as compared with 104 per cent for the same cows on basal ration in a reversal trial. At the same time, the production of milk was increased 32 per cent on the reversal trial, and 12 to 22 per cent on continuous feeding of thyroprotein as compared with an 8 per cent loss for the control cows in this study.—*J. Dai. Sci., Aug., 1950:531-538.*

"Promotants" in Nutrition

The term "promotant" is suggested for identifying any substance which helps to bring about faster growth or better feed efficiency or improved reproduction by its action on the intestinal flora, when added to the diet of a nonruminating animal. A promotant may be a drug, a vitamin having indirect action, or any similar agent, singly or combined. Examples are antibiotic drugs, the phenylarsonic acid derivatives, and some of the sulfonamides.

Calcium deficiency in the young is generally the prodrome of osteomalacia in later life. Primary bovine osteomalacia of adults occurs chiefly in pregnant animals, especially in the overbred, heavy milker, or from the bone-raiding action of hyperparathyroidism.

Nutrition and Calories.—These are two commonly misused words. Nutrition is not food, it is food at work; and calories are not fuel, they are the measurement of the fuel that food provides.

EDITORIAL

The Hog Cholera Problem

Until the beginning of the twentieth century, the raising of pigs was a hazardous project. The chief source of loss was the severe and destructive outbreaks of hog cholera.

The discovery, in 1905, that the disease was caused by a virus led to development of a process for immunizing hogs with the simultaneous injections of live virus and immune serum. With the expanding use of this method of immunization, the epizoötics appeared less regularly and were less severe. Since 1926, there has been no major epizoötic, and the raising of pigs has become a predictable farm venture.

The Present Status

The simultaneous use of virus and immune serum has provided a vaccinal procedure which is nearly perfect for healthy animals. It provides a solid immunity within a reasonable time, and it lasts a lifetime. Its greatest drawback is that, while it is protecting the strong animals, it is exposing the weak to an additional hazard, and is also exposing the susceptible animals in adjacent pens and even on adjacent farms. Because the virus used is fully active, and because it is available to the breeders and raisers of pigs (some trained in its use and others having no regard for the dangers of careless use) hog cholera is being controlled but it is not being eradicated.

During the pre-war years, it was estimated that hog cholera cost the people of the United States an average of $30 million a year—as much as $65 million in some years. Since the war, even the latter figure is probably low, for the increasing demand for meat has resulted in the raising of ever greater numbers of pigs and inflation has increased the dollar value of the crop far beyond pre-war levels.

It has been pessimistically estimated that, in the aggregate, the annual cost of hog cholera—including losses and vaccination—is probably as great as it would be without the use of virus vaccination. This estimate, undoubtedly, is more pessimistic than necessary, but the situation is sufficiently grave to have impelled the Committee on Animal Health of the National Research Council to prepare a special statement concerning the problem. The complete report will be found on page 227 of this issue of the JOURNAL.

The report referred to above outlines a basic plan which might be used as a beginning toward the eradication of hog cholera. It does not pretend to be a complete or all inclusive plan for all communities, but it does appear to be a start toward "the thorough study and investigation that its economic importance justifies."

The idea of hog cholera eradication is not new. This is indicated by the fact that the National Research Council report was written in 1946 and is just now being released. In the interim, it has been discussed by individuals and groups from many angles.

Also, the 1947 AVMA Committee on Diseases of Food-Producing Animals said: "With the rapid turn-over in hog population, we might eradicate hog cholera in five years with proper organization."

The AVMA and its members owe to the people of the United States—pork consumers and swine owners—full coöperation in the plan to provide a thorough study and a program for eradicating hog cholera.

Hog Cholera Eradication Resolution

The following resolution was adopted by the Georgia Veterinary Medical Association at a recent meeting, and a copy was forwarded to the AVMA by Dr. C. C. Rife, secretary.

WHEREAS: Hog cholera is the No. 1 swine disease in Georgia and in the nation and levies a toll of many millions of dollars annually on the swine industry and

WHEREAS: Georgia ranks ninth in the nation in the number of hogs and

WHEREAS: In the light of present knowledge of this disease and of eradication and control procedures effective in other countries this disease can properly be considered an eradicable condition and

WHEREAS: The swine growers of Georgia as represented by the Georgia Swine Breeders Association have expressed themselves as being in favor of accomplishing this goal and

WHEREAS: Due to the interstate shipment of hogs this disease should be attacked on a national scale,

THEREFORE, be it resolved that the Georgia Veterinary Medical Association recommend to the chief of the Bureau of Animal Industry in Washington, D.C., that plans for the eradication of this disease be drawn up and funds for its execution requested from the Congress and that copies of this resolution be forwarded to Georgia members of the national Congress, to the executive secretary of the American Veterinary Medical Association, to the president of the United States Livestock Sanitary Association, to the executive secretary of the American Meat Packers Institute, to the secretary of the Agricultural Editors Association, to the secretaries of the veterinary medical associations of the various states, and to the secretaries of swine registry associations with the request that they lend all possible aid and assistance to the accomplishment of the objectives of this resolution.

Dr. Klussendorf Resigns from AVMA Staff

The Board of Governors announces, with great regret, the resignation of Dr. Raymond C. Klussendorf as editor-in-chief of AVMA publications, effective April 1, 1951, to accept a position as director of Veterinary Medical Services with Commercial Solvents Corporation, Terre Haute, Ind. Dr. Klussendorf joined the headquarters staff of the Association April 1, 1945, as associate editor and assistant executive secretary, which positions he filled until last August at which time he was made editor-in-chief on account of the retirement of Dr. L. A. Merillat to an emeritus status.

During his six years with the Association, Dr. Klussendorf brought to his work great ability, energy, and enthusiasm and keen appreciation of the interests and problems of practicing veterinarians, all of which were reflected in his editorial tasks and in his many contacts with the veterinary profession at meetings and conferences of all kinds. His breadth of viewpoint and vision on professional and scientific developments were of great value in his work with various groups inside and outside the veterinary profession.

The Association officials and membership will keenly regret to lose the direct benefit of his endeavors which contributed so definitely to the work of the profession and the Association. However, in his new field of activity, it is certain that Dr. Klussendorf will have opportunities to make other contributions to veterinary medicine and the profession which he has represented and served so capably in his private and official duties.

The good wishes of his many friends in all walks of life go with him in his new position, and the organization with which he will be associated is to be congratulated for selecting a man of outstanding attainments and capabilities to head up their expanding program in the veterinary medical field.

The AVMA Board of Governors has taken steps to find a replacement for the editorial position, and announcement of Dr. Klussendorf's successor will be made in due time.

Dr. Donham Appointed Editor ad Interim

Until an editor is obtained for the JOURNALS of the Association, Dr. C. R. Donham, professor of veterinary science at Purdue University, West Lafayette, Ind., will serve in that capacity.

Dr. Donham was able to accept this responsibility because he retired a short time ago from his administrative duties as head of the Department of Veterinary Science at Purdue.

In view of his long career in teaching and research, the AVMA is fortunate to have secured Dr. Donham's services for this intervening period.

Laryngeal tuberculosis in man is reported to respond favorably to treatment with streptomycin administered as aërosol in 6 cases by Carlos Larroude (*Cadernos Cientificos*, *2*, [June, 1948]: 37-45).

When moving, notify the AVMA Office 600 S. Michigan Ave., Chicago 5, Ill.

CURRENT LITERATURE

ABSTRACTS

Genital Infections in Bulls

In this investigation, no bacteria were found in the testes, epididymides, ampullae of the vasa deferentia, seminal vesicles, prostate, and bulbo-urethral glands of 45 bulls. Five steers were also studied and were similarly negative (testes and epididymides having been removed by castration). Every specimen examined (50) had bacteria on the surface of the glans penis and the prepuce.

The author concludes that more extensive investigations are needed to establish the significance of the bacteria present.—[*H. J. Ruebke: Bacterial Flora of the Bovine Male Genitalia. Am. J. Vet. Res., 12, (Jan., 1951): 14-19.*]

Hematology of Barren Mares

A study of the blood picture of 70 healthy Thoroughbred barren mares revealed the following average blood values and their standard errors: erythrocytes, 9.94 ± 0.108 million per cubic millimeter; hemoglobin, 13.83 ± 0.131 Gm. per 100 ml. of blood; packed volume of erythrocytes, 43.05 ± 0.405 per cent; leucocytes, 10.37 ± 0.200 thousand per cubic millimeter; mean corpuscular volume, 43.17 ± 0.293 cubic microns; and a mean corpuscular hemoglobin concentration of 32.10 ± 0.149 per cent.

The differential leucocyte counts showed the following mean percentages and standard errors: neutrophils, 48.2 ± 0.914; lymphocytes, 44.5 ± 1.040; monocytes, 1.7 ± 0.157; eosinophils, 4.6 ± 0.887; and basophils, 0.5 ± 0.029.—[*M. F. Hansen; A. C. Todd; G. W. Kelley; M. Cawein: Studies on the Hematology of the Thoroughbred Horse. IV. Barren Mares. Am. J. Vet. Res., 12, (Jan., 1951): 31-34.*]

Infectious Anemia

Although this article does not contain enough experimental data to evaluate the work, it is interesting because the conclusions have apparently been officially approved in the U.S.S.R. and the author is being acclaimed as the discoverer of a new, revolutionary, and thoroughly Russian theory of the nature of filterable viruses and bacteria. His sweeping generalizations grew out of his work with the virus of infectious anemia of horses. By methods which he does not discuss in this paper (he has recently published a book on the subject), he claims to have grown the causative agent in the form of microscopically visible round granules, on artificial mediums, from the filterable virus. He observed and recorded the stages in the transformation, and demonstrated the identity of the visible (bacterial) and filterable forms. He also claims to have changed both forms into crystals, which were extremely resistant to physico-chemical influence and could be returned to the filterable or bacterial state.

It is further claimed that the destruction of erythrocytes in the disease is a secondary effect, that the virus attacks the leucocytes and the cells of the reticulo-endothelial system. The decrease in erythrocytes is caused by toxic action on the blood-forming organs by the degeneration products of nucleoproteins. The author devised a diagnostic test for infectious anemia based on the presence of nucleoproteins in the blood. This test is said to have revealed a much wider distribution of the virus than could have been determined by "complex methods of diagnosis."

The method of culturing the bacterial form of the virus has made it possible to demonstrate the high incidence of virus carriers in horses. The bacterial form was obtained from 400 horses, more than half of which appeared to be completely healthy. The pathogenicity of the bacterial form obtained from apparently healthy horses was tested by inoculation of 20 foals, with positive results.

The author claims to have isolated the causative agent from cattle, sheep, swine, rabbits, chickens, and dogs, confirming the pathogenicity of the organisms by inoculation of foals.

An allergenic diagnostic agent (anemin) was prepared from the bacterial form of the virus. It is used in an ophthalmic test which requires two applications and a period of five or six days. It gave positive results in 98 per cent of horses sick with the disease. Of 1,000 healthy horses from a nonenzoötic area, 4 reacted. In areas where the disease was enzoötic, 70 to 80 per cent of the horse population reacted positively. The results of the test were in agreement with the pathologic examination of 60 animals, and with foal inoculation tests.

The virus is said to be too widespread for eradication by slaughter and quarantine methods. The disease should be combated by increasing the resistance of the animal with better feed, housing, and working conditions. It is also recommended that the horses be raised locally. Sick animals should be treated symptomatically, with most of the emphasis on the diet. The recommended medication is spirits of camphor, camphorated oil, caffein, and calcium chloride. Convalescent animals should be gradually returned to work.

A prophylactic and therapeutic vaccine was tested on 429 horses with favorable results, but the conditions of the test are not given.—[*G. M. Boshyan: All-Union Institute of Experimental Veterinary Medicine: On Infectious Anemia of Horses. Veterinariya, 27, (June, 1950): 8-14.*]

This article appeared in *Medycyna Weterynaryjna* in Polish in July. A subsequent article by the same author, published in the Russian veterinary journal in July, was translated for the edification of the Poles in August. The great propaganda value placed on Boshyan's "discoveries" is difficult for us to understand. It seems to be part of a general program, founded on Lysenko's Soviet biology, which seeks to convince the people that any desired end can be obtained, whether in plant or animal breeding, or in the control of infectious disease, by improving the environmental conditions. All the evidence indicates that they have plently of room for improvement.—R. E. H.

Salmonella and Proteus Infections in Dogs and Cats

Salmonella infections were found in about 1 per cent of the dogs examined at Pullman, Wash. This is lower than previous reports. Proteus infections, on the other hand, were found in the feces of an extremely high percentage of apparently normal dogs and dogs affected with a wide variety of nonenteric conditions. So much so, that the authors conclude that members of the genus Proteus belong to the normal intestinal flora of the dog.—[*J. R. Gorham and F. M. Garner: The Incidence of Salmonella Infections in Dogs and Cats in a Nonurban Area. Am. J. Vet. Res., 12, (Jan., 1951): 35-37.*]

BOOKS AND REPORTS

The Boston Terrier

The author discusses this "American-made" breed, and carries the story decade by decade from the origin of the breed in the city from which it derives its name to the present day. Succeeding chapters deal with technical items concerning the official standard for the breed, the showing of the breed, and the bloodlines.

The chapter on anatomy, health, and diseases is very brief, and is exemplified by the statement that "The desirability of possessing information for maintaining the dog's health, avoiding careless errors, and doing what should be done in cases of first aid and emergency still exists; but the layman dog owner and breeder who knows most about the physical needs of the dog, is the first to patronize the veterinarian."—[*The Boston Terrier. By Vincent G. Perry. 3rd ed. Cloth. 160 pages. 205 illustrations. Judy Publishing Co., 3323 Michigan Ave., Chicago 16, Ill. 1950. Price $3.50.*]

Laboratory Apparatus and Reagents

This is essentially a catalog which lists more than 15,000 items which have been selected for laboratories of chemistry and biology in their application to education, the industries, medicine, and the public services.

As such, it would normally not be reviewed, but the very magnitude and scope of the fields covered seems to warrant acknowledgement of this book with its 1,272 pages devoted to laboratory apparatus, 124 additional pages of listing of reagents, and finally 61 pages of index.

Although the AVMA office staff has no direct use for the items listed, we offer use of the book to any member wishing to consult it while in Chicago.—[*Laboratory Apparatus and Reagents. Arthur H. Thomas, Co., West Washington Square, P. O. Box 779, Philadelphia 5, Pa.*]

The Chemical Formulary

For the veterinarian who likes to compound items for himself, either for professional use or for sheer relaxation and pleasure, this book will provide almost endless hours of fun and unnumbered new products.

Thousands of industrial formulas are listed, many with their formulation methods, and every formula listed in this book is different from those of previous volumes. The newest developments are the ones reported.

The alphabetical list of chemicals and trademark products will help to find the chemicals needed or desired. A book which must be seen to be appreciated, and must be used before it can be judged.—[*The Chemical Formulary. B. H. Bennett. Vol. 9. Cloth. 648 pages. The Chemical Publishing Co., 26 Court Street, Brooklyn 2, N.Y. 1951. Price $7.00.*]

Bulletin

President Coffee Recovering

Dr. W. M. Coffee's many friends will be happy to know that hospital reports at time of going to press indicate that he is recovering satisfactorily from the shotgun wound in the chest, which he received during an unexplained attempt on his life Saturday evening, March 10.

The attack occurred in his animal clinic in La Center, Ky. The motive of his male assailant is not known.

THE NEWS

Eighty-Eighth Annual Meeting

Milwaukee, Wis.—August 20-23, 1951

New Techniques To Be Shown on Closed-Circuit Television

Registrants at the Milwaukee meeting will see a new chapter written into television history during a scientific program that may well revolutionize the proceedings of large veterinary medical conventions.

At four different hours on Tuesday and Wednesday, August 20 and 21, Association members and convention guests will see the latest clinical, surgical, and laboratory techniques on a large television screen in the main meeting-room of the Milwaukee auditorium.

The telecasts will be staged by veterinarians and shown only to the convention. Restriction of the telecasts to a single, specialized audience is achieved by the closed-circuit method, which channels the program from one section of the building where it is staged to a meeting-room in another section.

Closed-circuit telecasting will be new to veterinary medical convention proceedings. Its successful utilization at meetings in the field of human medicine led the Pitman-Moore Company division of Allied Laboratories, Inc., to underwrite its costs for the Milwaukee meeting as a contribution to the advancement of veterinary medicine. Radio Corporation of America, a pioneer in television development, is coöperating with the Pitman-Moore organization and the AVMA in presenting the program.

Actual planning of the demonstrations is left

Plan Telecasts for Milwaukee Meeting

Left to right—Mr. Hibbard O. Ball, vice-president, Pitman-Moore Company, Indianapolis; Dr. Wayne H. Riser, secretary, Section on Small Animals, Skokie, Ill.; Dr. L. R. Davenport, chairman, Section on Public Health, Springfield, Ill.; Dr. C. L. Miller, chairman, Section on Small Animals, Oak Park, Ill.; Dr. W. A. Young, treasurer, AVMA, Chicago; Mr. John Jewett, Pitman-Moore Company, Indianapolis; Dr. C. D. Van Houweling, chairman ex officio, Committee on Program, Chicago; Dr. George R. Burch, Pitman-Moore Company, New Augusta, Ind.; Mr. Herbert Sigler, Harry C. Phibbs Advertising Co., Chicago; Mr. W. L. Lawrence, Radio Corporation of America, Camden, N. J.; Dr. G. A. Gattelman, secretary, Section on Surgery and Obstetrics, Hartford, Wis.; Dr. G. W. Jensen, secretary, Section on General Practice, Antioch, Ill.; Dr. J. O. Alberts, secretary, Section on Poultry, Urbana, Ill.

to the Committee on Program, which represents the six scientific sections of the convention and is headed, ex officio, by Dr. C. D. Van Houweling of the AVMA staff. Preliminary plans were laid at a meeting in Chicago, February 9, attended by section officers and representatives of Pitman-Moore Company and RCA (see photo). Dr. W. A. Young, of Chicago, treasurer of the AVMA, is acting as adviser to the group and will assist in arranging the program on the basis of his wide experience in this field.

The plans call for an anesthesia demonstration for the Section on General Practice, laboratory techniques and poultry disease diagnosis for a joint session of the Public Health and Poultry sections, surgery for the Section on Small Animals, and large animal surgery for the Section on Surgery and Obstetrics. Each of these four programs will last one hour, and only one will be telecast at a time—thereby allowing everyone to see all of the demonstrations.

A veterinarian will serve as moderator and narrator for each of the programs. He will take no part in the demonstrations, but will function solely to direct attention to the highlights of various techniques and to keep the audience informed of details that otherwise might escape attention. On both days after the telecasts are over, convention registrants will be able to visit the auditorium area where the programs were staged, and an RCA representative will be on hand to explain mechanical aspects.

For a quick preview of this outstanding program: Dr. J. L. Hopping, Sr., of Atlanta, Ga., chairman of the Section on General Practice, put it this way, "It's going to be everything the old 'wet clinics' used to be—plus the fact that people will be able to see."

Plans for First Pan American Veterinary Congress in Peru Are Progressing

Recent information from Dr. José Santivañez, president of the Organizing Committee, is to the effect that the dates of the First Pan American Congress of Veterinary Medicine will be Oct. 20-26, 1951, in Lima, Peru. This congress is part of the celebration of the fourth centenary of the founding of San Marcos University (Universidad Nacional Mayor de San Marcos) the oldest university in the Western Hemisphere, as noted in the first announcements of the Congress in the JOURNAL (Sept., 1950: 238 and Oct., 1950: 344). The dates originally set were May 20-26, but have been changed to Oct. 20-26 as noted above.

Dr. Santivañez has submitted a tentative program which includes topics and speakers under five major headings. Prominent authorities from the several Pan American countries have been

—Milwaukee Journal Photo

The Wells Street Bridge (foreground) and a portion of the business district in Milwaukee, the convention city for the Eighty-Eighth Annual Meeting of the AVMA, Aug. 20-23, 1951.

invited by him to participate as delegates and speakers. The major topics are:

I. Diseases of major economic importance.
II. Public health and veterinary medicine.
III. Veterinary education.
IV. Factors affecting animal production.
V. Miscellaneous subjects.

Dr. Santivañez hopes that the United States will be represented by a good delegation from government and institutional agencies and has invited nearly 20 persons, mostly veterinarians from this country, to take part in the program. A cordial welcome also awaits members of the profession in all lines of activity, who may be able to combine a holiday in South America with attendance at the Congress. Airlines offer attractive "circle tour" rates, including Lima and other South American cities.

This first Pan American Veterinary Congress is patterned somewhat after the International Congresses that are usually held every four years, world conditions permitting. There will be sessions of the plenary assembly, five sections, board of directors, and committees to carry out the organized program of the Congress. The official languages will be Spanish and English. Interested persons desiring additional information should write (air mail) to:

Dr. José Santivañez, President
Organizing Committee
First Pan American Congress of Veterinary Medicine
University of San Marcos
Lima, Peru

or to the AVMA office which is helping to promote interest in, and attendance at, the Congress through the U.S. Committee appointed last year. This Congress can do much to promote better understanding and good will among the participating countries.

Predoctoral Alumni Fellowships Available

The board of trustees of the alumni fund of Michigan State College has established seven predoctoral alumni fellowships, ranging in value from $800 to $1,200 per year. Fellows will be exempt from student tuition fees. Applications are invited by the dean of the Graduate School before May 15, 1951, from graduate students, either resident or nonresident, who wish to pursue a course of study for the Ph. D. degree at Michigan State College.

One postdoctoral alumni fellowship of $3,000 per year is also available for research in any special field for which Michigan State College has appropriate facilities.

S/THOMAS H. OSGOOD, *Dean, School of Graduate Studies.*

AVMA Research Fellows

Leslie E. McDonald was born Oct. 14, 1923, at Middletown, Mo. He was educated at Michigan State College (B.S., 1948; D.V.M., 1949). He had served in the Armed Forces prior to 1945. Upon graduation, he entered general practice at Berlin, Wis. The work on his fellowship will be done at the University of Wisconsin, Madison.

Dr. Leslie E. McDonald

PLAN OF THE PROJECT

Dr. McDonald will study the problems concerned with reproduction in cattle. The first step is in determining the role of the corpus luteum in progesterone elaboration and pregnancy maintenance. It is anticipated that later work will embrace the study of the therapeutic value of uterine irrigation with the antibiotic agents in repeat breeder cows.

Supporting course work will be carried in physiology and pharmacology in the School of Medicine, also in endocrinology, biochemistry, pathology, and heredity.

STUDENT CHAPTER ACTIVITIES

Pennsylvania Chapter.—The following report summarizes the activities of the University of Pennsylvania Student Chapter of the AVMA for the fall term of 1950.

Vice-president Bryer opened the October 11 meeting, with 57 members present, and welcomed incoming students. Carl Huff gave a report of the Miami Beach meeting, and Dr. Donald Lee discussed installation of an honor system.

Mr. Ted Woodley, manager of a Standardbred farm, spoke at the November 21 meeting and answered questions from the floor.

On December 4, there was further discussion

of the honor system and a vote of confidence was taken. Mr. Carl Dawson, Pennsylvania State College Poultry Extension, discussed poultry on a local and national scale at the December 13 meeting.

On Jan. 10, 1951, Mr. Lloyd R. Bechtel spoke on "How the Bank Looks at a Loan," and Dr. Kennedy, assistant dean of men at the Medical School, explained the setup of the honor system at the Medical School.

Dr. Mark Morris spoke on "Canine Nutrition" at the January 17 meeting. The following officers were elected for the spring semester: Clarence J. Bryer, president; William C. Greendyk, vice-president; Lynn R. Derby, secretary; and Alfred G. Oliver, treasurer.

s/LOY C. AWKERMAN, *Secretary.*

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Michigan Chapter.—A review of the fall term highlights of the activities of the Michigan State College Student Chapter of the AVMA are presented herewith.

Speakers at the meetings included **Drs. W. Leckfeldt,** Plymouth, Mich.; **R. E. Brown,** Williamston; **R. P. Azelton,** Mason; and **C. D. Van Houweling,** assistant executive secretary of the AVMA, Chicago.

Officers for the spring and fall terms were David Van Meter, president; George Lynch, president-elect; William Burmeister, vice- president; David Reath, secretary; Richard Kratochvill, assistant secretary; Bernard Mleziva, treasurer; and George Ziton, sergeant at arms.

s/DAVID REATH, *Secretary.*

WOMEN'S AUXILIARY

Mrs. C. L. Miller, Secretary.—The secretary of the Women's Auxiliary to the AVMA is Mrs. C. L. Miller of River Forest, Ill. She

Mrs. C. L. Miller

is known to the wives of veterinarians all over the country because of the friendly notes she takes time to write when sending out membership cards.

Mrs. Miller is active in civic affairs, the Eastern Star, the Red Cross, and various clubs. She has always been interested in the work of the Women's Auxiliary, both state and national. She served as the first president of the Women's Auxiliary to the Chicago Veterinary Medical Association, and later as treasurer of the Illinois state auxiliary.

As secretary-treasurer of the Women's Auxiliary to the AVMA from 1942 to 1948, she did an outstanding piece of work in organization and detail. At the time the new constitution and by-laws were adopted (1948), the office of secretary-treasurer was broken down into two offices, secretary and treasurer, because of the rapid growth of the membership. Since 1948, Mrs. Miller has served as secretary, and has seen the membership reach 2,000—and still growing.

The following is a report prepared by Mrs. Miller showing the number of auxiliary members in each state as of Jan. 15, 1951. Since this report the membership has reached the 2,000 mark. A look at the AVMA "Directory," which lists the number of veterinarians in each state (members and nonmembers) will reveal the potential membership of the state and national auxiliaries. Mrs. Miller has worked out these figures, as well as the number of auxiliary members in each state, but space does not permit us to publish them.

Membership by States of Women's Auxiliary to the AVMA

State	Members	State	Members	State	Members
ALA.	28	MD.	18	PA.	59
ARIZ.	31	MASS.	16	R. I.	3
ARK.	24	MICH.	59	S. CAR.	16
CALIF.	177	MINN.	29	S. DAK.	7
COLO.	29	MISS.	11	TENN.	45
CONN.	15	MO.	49	TEXAS	46
DEL.	3	MONT.	000	UTAH	29
D. C.	7	NEB.	29	VT.	25
FLA.	73	NEV.	1	VA.	14
GA.	40	N. H.	8	WASH.	57
IDAEO	28	N. J.	17	W. VA.	20
ILL.	284	N. MEX.	34	WIS.	46
IND.	87	N. Y.	81	WYO.	27
IOWA	65	N. CAR.	29	CANADA	17
KAN.	70	N. DAK.	15	MEXICO	1
KY.	23	OHIO	105	PUERTO RICO	1
LA.	26	OKLA.	28	SANTIAGO, CUBA	1
MAINE	19	ORE.	14	Total	1,986

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Indiana Auxiliary.—The Women's Auxiliary to the Indiana State Veterinary Medical Association had an outstanding meeting this year. The auxiliary joined the association in the opening session on Jan. 10, 1951, with Mrs. Roy Elrod, president, giving the welcoming address and reading an original poem as a tribute to the wives of veterinarians.

A mixer was held the opening night in the mezzanine of the Hotel Severin. Group singing was enjoyed and refreshments were served. The annual luncheon was held in the Rainbow

Room of the Severin Hotel, January 11, with about 90 women present. After the luncheon, a business meeting was held with Mrs. Roy Elrod presiding. A report of the AVMA meeting in Miami Beach was given by Mrs. C. Harvey Smith, Crown Point. During the business meeting, the following officers were elected: Mrs. C. R. Baumgartner, Spencerville, president; Mrs. R. J. Hoskins, Indianapolis, first vice-president; Mrs. J. E. Carver, Michigan City, second vice-president; Mrs. J. J. Arnold, New Castle, secretary; Mrs. C. E. Thomas, Logansport, treasurer; Mrs. Roy Elrod, Indianapolis, delegate to national Auxiliary meeting; Mrs. W. G. Magrane, Osceola, alternate; Mrs. F. G. Brown, Indianapolis, parliamentarian; Mrs. Paul T. White, Indianapolis, historian.

s/Mrs. J. J. Arnold, *Secretary.*

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Louisiana Auxiliary.—Thirty-seven members attended the annual meeting of the Women's Auxiliary to the Louisiana State Veterinary Medical Association at the Louisiana State University on Jan. 23-24, 1951. The following officers were elected for the coming year: Mrs. R. B. Lank, Baton Rouge, president; Mrs. A. V. Young, Shreveport, vice-president; Mrs. W. E. Brewer, New Orleans, secretary-treasurer.

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Ohio Auxiliary.—The Women's Auxiliary to the Ohio State Veterinary Medical Association met in Columbus at the Deshler-Wallick Hotel, Jan. 3-4, 1951. A social hour and card party was enjoyed on the first day. The next morning, after being entertained at a breakfast and television show, the business meeting reports were given by the delegates who had attended the Miami Beach meeting. Mrs. J. E. Scatterday, past-president of the Florida auxiliary, and now chairman of the nominating committee of the Women's Auxiliary to the AVMA, and Mrs. V. H. Miller, Charleston, W. Va., immediate past-president of the Women's Auxiliary to the AVMA, were guests of the auxiliary.

Officers elected for the coming year were: Mrs. Vernon Tharp, Hilliard, president; Mrs. C. J. Griffin, Springfield, vice-president; Mrs. L. R. Richardson, Ravenna, secretary-treasurer.

A most enjoyable luncheon concluded the women's activities.

s/Mrs. L. R. Richardson, *Secretary.*

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Oklahoma Auxiliary.—The winter meeting of the Women's Auxiliary to the Oklahoma State Veterinary Medical Association was held Jan. 8-9, 1951, at the Skirvin Hotel in Oklahoma City. After luncheon, the business meeting was held, at which the following officers were elected: Mrs. Walter Mason, Clinton, president; Mrs. W. D. Bowerman, Oklahoma City, president-elect; Mrs. Robert Todd, Tulsa, first vice-president; Mrs. Jim Corcoran, Oklahoma City, second vice-president; Mrs. Clarence Love, Nowata, secretary-treasurer; Mrs. Raymond Butler, Stillwater, parliamentarian; Mrs. Chester Williams, Butler, historian.

s/Mrs. Clarence Love, *Secretary.*

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Tennessee Auxiliary.—The Women's Auxiliary to the Tennessee Veterinary Medical Association met at the Maxwell House Hotel in Nashville on Jan. 15-16, 1951. Thirty-one women registered at the meeting. In addition to the business meeting, the members enjoyed coffee, brunch, and shopping. They voted to donate $25 to the library at Auburn, Ala., and $10 to the national organization. Mrs. Dennis Coughlin, president of the Auxiliary to the AVMA, was the principal speaker. She gave a most inspiring talk on the splendid work that the national auxiliary is doing and also outlined other fields of work in our own state. The following officers were elected: Mrs. H. W. Hayes, Knoxville, president; Mrs. G. P. Hatchett, Jr., Chattanooga, first vice-president, eastern Tennessee; Mrs. Harry Morgan, Clarksville, first vice-president, middle Tennessee; Mrs. E. B. Mount, Memphis, first vice-president, western Tennessee; Mrs. C. E. Byrd, Fayetteville, secretary; Mrs. Ray Gathman, Franklin, treasurer.

s/Mrs. C. E. Byrd, *Secretary.*

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Wisconsin Auxiliary.—On Jan. 10-11, 1951, the Women's Auxiliary to the Wisconsin Veterinary Medical Association met in the Schroeder Hotel in Milwaukee.

Following the luncheon and style show on Wednesday in the Empire Room of the Hotel, Mrs. F. W. Milke, auxiliary president, introduced the guest speaker, Mrs. L. R. Richardson, Ravenna, Ohio, third vice-president of the AVMA Auxiliary. The petite and vivacious Mrs. Richardson presented many important facts regarding national convention work.

The Women's Auxiliary to the Wisconsin Veterinary Medical Association extends a cordial invitation to the women to attend the forthcoming national convention in Milwaukee.

s/(Mrs. K. G.) June Nicholson, *Secretary.*

U. S. GOVERNMENT

Foreign Service.—Veterinarians are needed for service in foreign countries in connection with the Point IV program of technical assistance. The work will consist largely of organizing and training men to carry on livestock sanitation programs. Assignments are generally for two years, with expenses of men and their families paid to the field and for return when the assignment is completed. Salaries and allowances come to somewhat more than is paid for similar work in the United States.

For further information address Mr. Evan W. Hadley, Operation Division, Technical Collaboration Branch, U. S. Department of Agriculture, Office of Foreign Agricultural Relations, Washington 25, D.C.

s/EVAN W. HADLEY.

APPLICATIONS

The listing of applicants conforms to the requirements of the Administrative By-Laws—Article X.

First Listing

ANDERSON, EUGENE E.
111 Blackburn St., Ripon, Wis.
D.V.M., Kansas State College, 1943.
Voucher: B. A. Beach.

CHAMBERS, JAMES L.
Box 61, Eufaula, Ala.
D.V.M., Alabama Polytechnic Institute, 1950.
Voucher: I. S. McAdory.

CONNOR, EDWARD C.
113 W. North St., Morris, Ill.
D.V.M., Iowa State College, 1947.
Voucher: A. G. Misener.

CULVER, SYLVAN D.
115 Cox St., Auburn, Ala.
D.V.M., Alabama Polytechnic Institute, 1936.
Voucher: I. S. McAdory.

DEAN, GILBERT F.
Box 18, LaCenter, Ky.
D.V.M., Alabama Polytechnic Institute, 1943.
Voucher: Ross Brown.

DIEHL, ERWIN D.
Kintnersville, Pa.
V.M.D., University of Pennsylvania, 1920.
Voucher: Raymond C. Snyder.

DUCKWORTH, JAMES V.
4516 8th St., Meridian, Miss.
D.V.M., Alabama Polytechnic Institute, 1923.
Voucher: J. A. Randle.

ELLGEN, WALTER F.
Ivanhoe, Minn.
D.V.M., Iowa State College, 1933.
Voucher: B. S. Pomeroy.

EVANS, JOHN JAMES
425 Milledge Road, Augusta, Ga.
D.V.M., Kansas City Veterinary College, 1917.
Voucher: Chas. C. Rife.

FANNING, JAMES J.
642-A Hale St., Beverly Farms, Mass.
D.V.M., Ontario Veterinary College, 1940.
Voucher: C. Lawrence Blakely.

FOGG, DONALD E.
Box 33, Dagsboro, Del.
V.M.D., University of Pennsylvania, 1945.
Voucher: Clarence A. Woodhouse.

GAUNT, DAVID G.
Gen. Del., South Edmonton, Alta.
D.V.M., Ontario Veterinary College, 1950.
Voucher: J. C. Wainwright.

GOLDMAN, CARLOS
P.O. Box 1312, Caracas, Venezuela.
D.V.M., Cantonal University of Berne, 1940.
Vouchers: Claudio E. Muskus and Carlos Ruiz Martinez.

JOHNSON, WALTER F.
2025 Magnolia Ave., Janesville, Wis.
D.V.M., Kansas State College, 1944.
Voucher: B. A. Beach.

JONES, GEORGE W.
140 Birmingham Highway, Prattville, Ala.
D.V.M., Alabama Polytechnic Institute, 1950.
Voucher: I. S. McAdory.

LYDAY, JAMES M.
1421 Henry Ave., Des Plaines, Ill.
D.V.M., Ohio State University, 1947.
Voucher: A. G. Misener.

MAGILTON, JAMES H.
1210 6th St., David City, Neb.
D.V.M., Iowa State College, 1946.
Voucher: Ordella Geisler.

MORRISON, ROBERT K.
3007 E. Main St., Danville, Ill.
D.V.M., Iowa State College, 1949.
Voucher: A. G. Misener.

O'DONNELL, F. C.
Strawberry Point, Iowa.
D.V.M., Iowa State College, 1944.
Voucher: F. B. Young.

PRAVITZ, SAUL
2011 Lincoln Ave., Chicago, Ill.
V.M.D., University of Pennsylvania, 1935.
Voucher: A. G. Misener.

SELBY, STEPHEN A.
3264 P St., Washington, D. C.
D.V.S., NewYork-American Veterinary College, 1908.
Vouchers: W. M. Mohler and C. D. Stein.

SHIPSIDES, STANLEY H.
206 Birch St., Wauseon, Ohio.
D.V.M., Ontario Veterinary College, 1943.
Voucher: F. J. Kingma.

TRACE, JAMES C.
244 Sherborne Dr., Columbus, Ohio.
D.V.M., Ohio State University, 1949.
Voucher: F. J. Kingma.

Second Listing

BAKER, DONALD C., Box 887, Sidney, Mont.

BOWLBY, GRANT L., Belmont, Ont.

BOYCE, G. K., S.P.O. #9, London, Ont.

DEVALOIS, DONALD G., Sanborn, Iowa.

FREEMAN, ROBERT F., 404 E. 5th St., Canton, S. Dak.

GREENE, RUDOLPH, Greenacres, Brighton, Ill.

KALVAITIS, ALFONSAS, 122 Eastern Ave., Augusta, Maine.

LANGILL, WILLIAM J., 6325 cote de Liesse Rd., Dornal, Que.

MCKAY, ALAN G., 44 Long Branch Ave., Long Branch, Ont.

MIDDLETON, RONALD B., 1656 S. Oak Ave., Freeport, Ill.

SANDERS, JACK M., 307 S. Wellington St., Marshall, Texas.
SLAVIK, NORMAN R., Coldwater, Ohio.

AMONG THE STATES AND PROVINCES

Alabama

State Association.—The Alabama State Veterinary Medical Association met at the Whitely Hotel in Montgomery on Feb. 16-17, 1951. Speakers at the Friday afternoon session were **Drs. R. S. Sugg,** dean, School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn; **Paul Newberne,** Auburn; **H. L. Allen,** Demopolis; **H. F. Findley,** Atmore; **W. H. Hines,** Monroeville; **G. C. Walding,** Enterprise; **Ray Ashwander,** Decatur; **M. L. Crawford,** Marion; **J. H. Ryland,** Selma; **J. B. Taylor,** Elba; **Lew Llewellyn,** Auburn; **J. A. Atkinson,** Livingston; **C. L Holloway,** Mobile; **W. S. Bailey,** Auburn; **Joe Sledge,** Greensboro; **C. H. Jones,** Athens.

The following speakers participated in the Saturday session: **Colonel James R. Sperry,** V.C., Fort McPherson, Ga.; **Drs. F. A. Clark,** Auburn; **E. A. Davis,** Columbus, Ga.; **M. K. Heath,** Birmingham; **K. U. Jones,** Birmingham; **C. E. Kennedy,** Mobile; **W. N. Konde,** Auburn; **C. L. Holloway,** Mobile; **G .C. Cloyd,** Florence; **G. J. Phelps, Sr.,** Montgomery; **G. C. Kendall,** Montgomery; **W. S. Bailey,** Auburn.

s/R. S. SUGG, *Dean.*

District of Columbia

District Association.—The District of Columbia Veterinary Medical Association met at the Mayflower Hotel on January 23 for its first quarterly meeting of 1951. **Major Chester A. Gleiser,** V.C., Armed Forces Institute of Pathology, and **Dr. Erwin L. Jungherr,** University of Connecticut, Storrs, were guest speakers.

New officers for the year were installed as follows: Drs. Chester A. Manthei, president; Colonel George L. Caldwell, first vice-president; E. Barnwell Smith, second vice-president; and Clarence H. Thompson, Jr., secretary-treasurer.

s/CLARENCE H. THOMPSON, JR., *Secretary.*

Illinois

State Association.—The sixty-ninth annual convention of the Illinois State Veterinary Medical Association was held Jan. 30-Feb. 1, 1951, at the Hotel Sherman in Chicago.

Kenneth B. Haas, Sr. (Ph.D.), Loyola University, Chicago; and **Dr. O. W. Seher,** inspector in charge, Chicago Meat Inspection Station, Chicago, addressed the group on Tuesday morning.

Speakers on the Tuesday afternoon Section on Small Animal Practice were **Drs. James Archibald,** Ontario Veterinary College, Guelph; **Dallas B. Phemister** (M.D.), University of Chicago School of Medicine; **S. F. Scheidy,** veterinary director, Sharpe and Dohme, Inc., Philadelphia, Pa.; **C. L. McGinnis,** Peoria; **J. K. Bone,** Chicago; **J. P. Coble,** Springfield; **D. Darlington,** River Forest; **L. E. Fisher,** Berwyn; **C. B. Krone,** LaGrange; **H. M. LeGard,** Weston, Ont.; **D. R. Peigh,** Chicago; **W. H. Riser,** Skokie; **E. C. Saunders,** Elgin.

Speakers on the Section on General Practice were **Drs. C. K. Mingle,** Brucellosis and Tuberculosis Eradication Division, Bureau of Animal Industry, Washington, D.C.; **J. O. Alberts,** University of Illinois College of Veterinary Medicine, Urbana; **George T. Edds,** Fort Dodge Laboratories, Fort Dodge, Iowa; **W. S. Gochenour,** biological laboratories, Pitman-Moore Company, Zionsville, Ind.; **Lyle A. Gray,** Bushnell; **A. A. Legner,** Sandwich; **C. C. Hastings,** Williamsville; **A. W. Olson,** Morrison; **J. W. Albrecht,** Princeton; **L. A. Dykstra,** Aurora; **C. C. Morrill,** Urbana.

Those speaking on the U.S. Bureau of Animal Industry Section were **Drs. Fred C. Mau,** Inspection and Quarantine Division, Chicago; **J. A. Bengston,** Pathological Laboratory, Chicago; **R. F. Harrington** (Ph.D.), Chicago; **C. K. Mingle,** Washington, D.C.; and **S. J. Berger,** Chicago Meat Inspection Station, Chicago.

Drs. F. J. Kingma, Ohio State University, Columbus; and **W. R. Graham** (Ph.D.), director of research, Quaker Oats Company, Chicago, spoke at the general session on Wednesday morning.

Those speaking on the Section on General Practice and Sanitary Science were **Drs. H. M. LeGard,** Weston, Ont.; **L. M. Hutchings,** Purdue University, LaFayette, Ind.; **H. P. Wessels,** Geneva; **L. E. St. Clair,** University of Illinois College of Veterinary Medicine, Urbana; **V. J. Novy,** Belleville; **A. M. Orum,** Carthage; **R. J. Kirkpatrick,** Galesburg; **H. E. Kingman,** Chicago; **B. L. Lake,** Rockford; **J. T. Foley,** Cary; **R. A. Thompson** (M.D.C.), Springfield; **L. R. Davenport,** Department of Public Health, Springfield; and **Mr. Howard T. Greene,** president, Brook Hill Farms, Inc., Genesee Depot, Wis.

Speakers on the Wednesday afternoon Section on Small Animal Practice included **Drs. F. J. Kingma; W. S. Gochenour; James Archibald; R. E. Ruggles; E. C. Khuen,** Evanston; **J. M. Gillispie,** Wilmette; **E. J. Van Tilborg,** Chicago; **C. L. Miller,** Oak Park; **C. H. Horstman,** Collinsville; **E. R. Kennedy,** Moline; and **R. C. Glover,** Evanston.

The following appeared as speakers at the general session Thursday morning: **Drs. J. R. Pickard,** Chicago; **Robert Graham,** dean, University of Illinois College of Veterinary Medicine, Urbana; **Brig. General J. A. Mc-**

Callam, chief, Veterinary Division, Office of the Surgeon General, Department of the Army, Washington, D.C.; **C. D. Van Houweling,** assistant executive secretary, AVMA, Chicago; **John Glen** (M.D.), Armour Laboratories, Chicago; **Roland R. Cross** (M.D.), Illinois Department of Public Health, Springfield; and **Mr. J. J. Shaffer,** AVMA public relations department, Chicago.

s/A. G. MISENER, *Secretary.*

Indiana

Wabash Valley and Northeastern Associations.—The Wabash Valley and Northeastern Indiana Veterinary Medical Associations held their annual small animal clinic Feb. 13, 1951, in Wabash, at the Honeywell Memorial building. Approximately 34 veterinarians and men representing biologic companies attended the meeting, in spite of adverse weather conditions. The program, which was outstanding in both subject matter and procedures, featured the following speakers: **Drs. K. McMahan, B. V. Allen, E. H. Allen,** and **F. McClead,** Fort Wayne; and **H. E. Jensen,** Cleveland, Ohio; and **C. L. Lindborg,** Monticello. **Drs. A. L. Keim** and **S. Williamson,** presidents of the associations, spoke at the banquet.

s/D. J. MYERS, *Secretary.*
J. L. KIXMILLER, *Resident Secretary.*

Iowa

East Central Society.—The East Central Iowa Veterinary Medical Society held a dinner meeting at the Ross Steak House, Cedar Rapids, on Feb. 8, 1951. **Drs. W. S. Gochenour,** Zionsville, Ind., and **C. H. Banks,** Tipton, were guest speakers.

s/WAYNE H. THOMPSON, *Secretary.*

Louisiana

Association Officers.—Officers elected at the twentieth annual conference of the Louisiana State Veterinary Medical Association on Jan. 23-24, 1951, are Drs. W. S. Hornsby, Lafayette, president; John Blunschi, Ferriday, vice-president; R. B. Lank, Baton Rouge, reëlected secretary-treasurer. Dr. W. T. Oglesby was elected delegate to the House of Representatives of the AVMA.

s/W. T. OGLESBY, *Resident Secretary.*

Minnesota

Dr. Moist Joins Faculty of Veterinary School.—In January, 1951, Dr. K. F. Moist (UP '50) joined the staff of the University of Minnesota School of Veterinary Medicine as an instructor in veterinary clinics. Since graduation, Dr. Moist has been associated with Dr. R. D. Hoffman, Bedford, Pa.

s/H. J. GRIFFITHS, *Resident Secretary.*

State Society Honors Dr. H. C. H. Kernkamp.—At the annual banquet of the Minnesota State Veterinary Medical Society, Dr. and Mrs. Howard Kernkamp were presented with a handsome, combination radio-television set as a token of appreciation of their friendship, long service, and unfailing interest in the welfare and advancement of the organization. Last year, Dr. Kernkamp, professor of veterinary medicine, School of Veterinary Medicine, University of Minnesota, St. Paul, asked to be relieved of the office of secretary-treasurer of the society after more than twenty years of untiring service.

Dr. and Mrs. H. C. H. Kernkamp with the radio-television presented to them by the Minnesota society.

North Carolina

State Association.—The thirteenth annual conference for North Carolina veterinarians was held at North Carolina State College, Raleigh, Jan. 23-25, 1951, with the College and the North Carolina State Veterinary Medical Association coöperating to bring the 100 members who attended one of the finest programs ever presented by this group.

The following guest speakers appeared on the program: **Drs. C. E. DeCamp,** Pitman-Moore Co., Indianapolis, Ind.; **M. A. Schooley,** Merck and Company, Rahway, N. J.; **Asa Winter,** Brucellosis and Tuberculosis Eradication Division, USDA, Washington 25, D. C.; **A. H. Quin,** Jensen-Salsbery Laboratories, Kansas City, Mo.; **Joseph W. Beard** (M.D.), Duke Medical School, Durham; **James A. Baker,** Cornell University, Ithaca; **James H. Steele,** Communicable Disease Center, Atlanta, Ga; **H. J. Rollins,** state veterinarian; **Frank M. Lee,** State Board of Health, Columbia, S. Car.; and **D. A. Burley,** School of Veterinary Medicine, University of Georgia, Athens, Ga.

Speakers from the faculty of the North Carolina State College were **Drs. J. Clark Osborne,**

Marvin L. Speck, G. H. Wise, Elliott R. Barrick, D. W. Colvard, D. S. Weaver.

s/J. H. BROWN, *Resident Secretary.*

Oregon

State Association.—The annual meeting of the Oregon State Veterinary Medical Association was held Jan. 19-20, 1951, at the Multnomah Hotel in Portland. Speakers on the program included **Drs. J. G. Strohm** (M.D.); **James Harrison,** Portland; **R. H. Lear** (M.D.); **Carl Howarth,** St. Helens; **Ervin Peterson,** Oregon State Department of Agriculture; **Lyle Nicholson,** Portland.

Officers elected at the meeting are Drs. Clifford A. Bjork, Portland, president; Carl R. Howarth, St. Helens, vice-president; Edward L. Holden, Oswego, secretary-treasurer; and Ernest L. Henkel, Silverton, executive board.

s/ROY H. PETERSON, *Resident Secretary.*

Virginia

State Association.—The Virginia State Veterinary Medical Association met at the Hotel Roanoke, Roanoke, Jan. 29-31, 1951.

The following speakers participated in the program: **Drs. J. E. Greene,** Alabama Polytechnic Institute, Auburn; **W. L. Bendix,** state veterinarian; **W. J. Gibbons,** Alabama Polytechnic Institute, Auburn; **D. K. Detweiler,** University of Pennsylvania, Philadelphia; **James A. Baker,** Cornell University, Ithaca, N.Y.; **I. D. Wilson,** Virginia Polytechnic Institute, Blacksburg; **C. E. DeCamp,** Allied Laboratories, New York City; and Messrs. **Firman E. Bear,** Soils Department, Rutgers University, New Brunswick, N.J.; **A. B. Massie,** Virginia Wildlife Unit, Virginia Polytechnic Institute, Blacksburg; and **J. Walton Robertson,** Department of Health, Lynchburg.

Officers elected at the meeting were Drs. F. E. Mullen, Harrisonburg, president; J. S. Landis, Norfolk, first vice-president; H. K. Cooper, Roanoke, second vice-president; W. L. Bendix, Richmond, secretary; G. H. Brumble, Jr., Fredericksburg, treasurer; T. P. Rowe, Richmond, delegate to AVMA House of Representatives. Dr. H. K. Royer, Lynchburg, was nominated for State Board of Veterinary Examiners.

A new field of direct activity was undertaken at this meeting. The Association elected from its membership a committee of five "to meet with the commissioner of agriculture and the state veterinarian as necessary, but not less than quarterly, to consider any and all problems pertaining to livestock and poultry diseases and their control within the Commonwealth, this committee to serve without compensation." One member is to be replaced each year. The members of the first committee are: Drs. Taylor P. Rowe, Richmond; R. L. Booth, Middleburg; C. R. Pastors, Staunton; John E. Lippincott, Lynnhaven; and J. E. Greer, Pulaski.

s/HARRY K. ROYER, *Resident Secretary.*

Wisconsin

Examination for Meat Sanitation Supervisor.—An examination for meat sanitation supervisor will be held April 6, 1951. Beginning salary for this position is $4,826 per annum. The examination consists of a rating of training and experience to be based upon a questionnaire submitted by applicants. Applicants must be graduate veterinarians with some experience in making antemortem and postmortem examinations. For further information write Mr. Ovid B. Blix, Milwaukee City Service Commission, Milwaukee 2, Wis.

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Dr. Wisnicky Recovering from Automobile Accident.—Dr. Walter Wisnicky who was the victim of a severe automobile accident immediately following the meeting of the Wisconsin Veterinary Medical Association reports improvement. Dr. Wisnicky suffered severe injuries to one leg, the back, the abdominal region, and the jaw as well as a vertical fracture of the first lumbar vertebra.

Dr. Wisnicky has been discharged from the hospital and is able to be up, but it is likely to be several months before he will again be able to practice.

VETERINARY MILITARY SERVICE

Questions and Answers Pertaining to Public Law 779

These questions and answers are extracts from a talk given Feb. 1, 1951, at the annual meeting of the Illinois State Veterinary Medical Association, Chicago, Ill., by Brigadier General J. A. McCallam, V.C.

Am I subject to induction under the Selective Service Act of 1948, even though I am a special registrant as a veterinarian under Public Law 779?

Yes.

Does that apply if I hold a commission in the Organized Reserve Corps, even though under 26 years of age?

Yes. Any Reserve officer who is under 26 years of age and who was appointed in the Organized Reserve Corps *subsequent* to 24 June 1948, who is not on active duty, who has *not* served on active duty more than twelve months between 16 September 1940 and 24 June 1948 or more than ninety days between 7 December 1941 and 2 September 1945 may be *inducted* into the service and trained under the basic provisions of the Selective Service Act of 1948. This statement

is equally applicable to those within the stated category who may have been commissioned in the Reserve as a result of Public Law 779, amending the Selective Service Act of 1948. Such a person may avoid the possibility of actual induction only by entering on active duty under his Reserve commission prior to the effective date of induction as ordered by his local Selective Service Board.

I thought accepting a commission under Public Law 779 prevented induction.

That is true only when the induction would take place pursuant to filling a requisition from the Armed Forces for the induction of personnel under the provisions of Public Law 779.

Will graduates receiving a degree in veterinary medicine subsequent to 16 October 1950 (date of first registration) be required to register under Public Law 779?

Yes, on the day the degree is received or within five days thereafter.

Where do these individuals register?

With any local draft board. If, however, already registered under the Selective Service Act of 1948, that person when registering pursuant to Public Law 779 should give the same address on line 2 of the questionnaire as was given when registering under the Selective Service Act of 1948.

Is a graduate of a foreign or domestic school of veterinary medicine not currently on the list approved by the Department of the Army for the purpose of appointment required to register under Public Law 779?

Yes.

Will an individual in this status be inducted under Public Law 779?

No person will be inducted under Public Law 779 who is not physically and professionally acceptable to the Department of Defense.

Will availables in the first and second priorities be called for service prior to those in the third and fourth priorities?

To give you a categorical answer—yes. You must remember, however, Public Law 779 provides for induction and establishes priorities; should it become necessary to induct veterinarians under the provisions of this law, they will be inducted in order of priorities 1, 2, 3, and 4.

Will those veterinarians registered under Public Law 779 who accepted commissions in the Veterinary Corps Reserve but who did not volunteer for immediate active duty be ordered into active service in accordance with the priorities established by the law?

Yes, when and as their services are required.

I registered on 16 October and am in priority 1. In completing DD Form 390, I stated on space 30 I did not want a commission in the Reserve Corps. Since then I have changed my mind and would like to obtain one. May I? If so, to whom should I apply?

To whom you apply will depend on where your DD Form 390 and other papers are. Your local draft board may know where. You may make the change at the time of the pre-induction physical examination. After the pre-induction physical, write a letter to the Commanding General, Attention Surgeon, of the Army Area in which you are located, requesting a commission and authorizing the necessary change in space 30 of DD Form 390.

Do I have to request active duty if I apply for a commission in the Veterinary Corps Reserve?

No. You may or may not make a concurrent request for active duty.

I am registered under Public Law 779 and desire a commission in the Veterinary Corps Reserve. What grade would I receive if appointed?

The answer depends to a considerable extent on the applicant's professional experience and age. The regulation currently in effect, among other requirements, prescribes for Veterinary Corps officers the following:

Minimum Years Experience	Grade	Maximum Age
0	2nd Lt.	32
1	1st Lt.	33-6/12
5	Captain	39-6/12
12	Major	48
19	Lt. Col.	50

I desire to call your attention to the fact that the requirement for Veterinary Corps Reserve officers at this time is in the grade of captain and below. We have accepted very few officers for active duty in the grade of major and, at present, only those with World War II experience. The vacancies in the grade of major and above are limited.

I am registered under the law in priority 1. If I apply for a commission, will I be commissioned in the Veterinary Reserve section of the Air Force or the Army?

You may be commissioned in either, and may express a preference. The Secretary of Defense has said that one third of those applying will be offered to the Air Force.

EMERGENCY PLANNING

PERSONNEL

Statement of Policy of National Advisory Committee to Selective Service

1) CLASSIFICATION OF TEACHERS IN MEDICAL, DENTAL, AND VETERINARY MEDICAL SCHOOLS

To meet the health needs of the military services and of the civilian population, the medical, dental, and veterinary medical schools must continue to educate and train as many physicians, dentists and veterinarians as their facilities will permit. In fact, these schools are being urged to do everything possible to accept and train more students. In order to do this, most schools need not only

to retain current teaching faculties, but may have to expand their teaching staffs.

Actually, qualified teachers in these professional schools are in exceedingly short supply.

As a general policy, therefore, the essential members of medical, dental, and veterinary medical faculties should be held in their teaching positions rather than released for military service.

This general policy, however, does not mean that no teachers should be released for military service. Many part-time teachers in certain schools devote relatively little time to teaching and their teaching duties could be assumed by other physicians, dentists, or veterinarians of the community who are not eligible for, or who have had, military service. Likewise, some of the younger full-time teachers, particularly in priorities I and II, could be replaced without serious loss.

On the other hand, there are certain few individuals in the younger age groups without military service who can make a more valuable contribution to the national welfare by continuing as teachers than they could by serving with the Armed Forces. Such individuals would be more likely to be in the basic science departments than in the clinical departments, although there might be a rare individual in priority I or II who should be deferred to continue as a full-time clinical teacher.

In states with several medical, dental, and veterinary medical schools, a committee of deans or of these professional teachers, could well be established on a consultant basis to the state advisory committee. In these, as well as in other situations, the recommendations of the deans relative to the deferment of teachers should be given the utmost consideration.

2) RESEARCH*

Make no mistake about it, the present uncertainty may last twenty years—and men of ability in research are extraordinarily important for our future. Their potentialities are not now easy to recognize or foresee. It is impossible to prove their value so early in their careers and it takes time for them to grow.

During the last war, most of the European countries, except Germany, safeguarded and utilized their best investigative minds more effectively than we did. But what was done by our men with plasma, ACTH, radar, and special weapons proves the value of betting on exceptional talent and special training in men of all ages. Because of their singular importance, research men should be given unusually discriminating consideration—indeed, the benefit of the doubt, i.e., further investigation by competent judges.

Two types of claims in behalf of research workers need especially careful attention.

When the director or originator of a research has been taken away from the project, a question must be raised as to the desirability of continuing the training of inexperienced junior research men without his direction and stimulus. Their qualifications, their present measure of experience and ability must be reviewed, as well as the relative significance of the research problem under study. Yet, some problems may prove extremely important even though not of immediately apparent applicability. Witness the studies in 1943 that led to ACTH, and to cortisone in 1949.

Judgment must be used also in any decision to start inexperienced junior men on nearly devised research projects. On the one hand, research must not be used as a haven for incompetents; nor on the other, should the claims of combat service be allowed to stop the supply or the training of obviously gifted men among the oncoming generation. Think of the waste if we had drafted Edwin Cohn as a machine gunner or E. O. Lawrence in the infantry! Relying, as we must, on new discoveries by fresh minds, it would be folly to ignore the wisdom for the future of finding, training, and using men of exceptional ability in research, even though they are still young.

Probably the opinion of medical and dental school deans and of specialists capable of having an opinion in the fields involved and on the individuals concerned will provide us with the best practical source of dependable judgment.

The National Advisory Committee enthusiastically endorses Dr. Gregg's suggestion, but in case of inability of the state advisory committees to pass judgment on an individual or project, it is suggested that assistance be requested from the National Advisory Committee.

*Statement made by Dr. Alan Gregg, member of National Advisory Committee.

CIVIL DEFENSE

Regional Meetings

Drs. S. O. Fladness and M. R. Clarkson, of the Inspection and Quarantine Division of the BAI, held a series of regional meetings during February and March for civil defense planning. At each of the ten meetings, the state veterinarians and federal veterinarians in charge, from four or five states, and one or two of their assistants attended. Canada, Puerto Rico, Hawaii, and Alaska were also invited to send representatives. Drs. W. R. Krill and C. D. Van Houweling, chairman and secretary, respectively, of the AVMA Emergency Advisory Committee, each attended several meetings. Other members of the AVMA committee represented the Association at the meeting which Drs. Krill and Van Houweling did not attend.

The purpose of the meetings was to broaden the existing coöperative arrangements for foot-and-mouth disease eradication, to encompass other exotic animal diseases, and to insure that these activities are integrated into civil defense planning.

The state veterinarians are charged with the responsibility of expanding the civil defense planning and organization within the states. Emphasis will be placed upon defense against biologic warfare directed against animals.

Advisory Committees

The following advisory committees have been appointed by the state veterinary medical associations:

Alabama

R. S. SUGG, chairman, School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn.
B. N. LAUDERDALE, 338 New Post Office Building, Montgomery.
I. S. McADORY, Box 410, Alabama Polytechnic Institute, Auburn.

Arizona

FRANK OLVEY, secretary, 5001 East Washington, Phoenix.
L. N. BUTLER, Jr., P. O. Box 445, Glendale.
R. J. HIGHT, 820 Forest Ave., Tempe.
K. O. LASSEN, Box 295, Mesa.
WILLIAM PISTOR, University of Arizona, Tucson.
CHARLES PRCHAL, 1722 E. Almeria Road, Phoenix.

California

H. S. CAMERON, chairman, University of California, Davis.
A. K. CARR, State Office Building, No. 1, Sacramento.
PAUL LOCKHART, 940 N. Highland, Hollywood 38.
W. A. McDONALD, Federal Bldg., Sacramento.
CHARLES PARSHALL, 530 Fulton St., San Francisco.
N. M. TWISSELMAN, 1246 Madison Ave., Bakersfield.
C. E. WICKTOR, 203 Administration Bldg., Union Stock Yards, Los Angeles 58.

Colorado

KENNETH V. BOLTON, 1601 Elm St., Rocky Ford.
FRANK J. E. COWLEY, Colorado Springs.
G. H. GILBERT, 5500 Wadsworth, Arvada.
JOHN W. HARRISON, 420 Sunset Drive, Longmont.
DALLAS H. KNAUS, Rifle.
WAYNE A. LEADBETTER, 710 South Race St., Denver.
LAWRENCE R. METZER, 3181 9th St., Boulder.
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DEATHS

★**Leland D. Bushnell,** Kansas State College, Manhattan, one of the nation's foremost bacteriologists and poultry pathologists, died Dec. 24, 1950, at the age of 70 years. Dr. Bushnell, who received his Ph.D. degree from Harvard in 1921, was an assistant in bacteriology at Michigan State College from 1905 to 1907, and was with the dairy division of the USDA during 1907 to 1908, at which time he joined the faculty at Kansas State College, where he became head of the Department of Bacteriology and bacteriologist in charge of the Kansas State Agricultural Station in 1912. He was retired in 1945 with the title of professor emeritus, but continued to devote full teaching time to the College. He was made an honorary member of the AVMA in 1948 for his outstanding work as a bacteriologist, poultry pathologist, and teacher of veterinary students.

★**George A. Fuchs** (SF '12), 67, Fresno, Calif., died of a heart attack in January, 1951. Dr. Fuchs came to Fresno in 1935 and was supervising meat inspector of 14 counties until 1940 when he retired because of ill health. He was admitted to the AVMA in 1929, and was also a member of the California State Veterinary Medical Association. Dr. Fuchs is survived by his widow and two daughters.

Edward K. Glover (KCVC '12), Wellington, Kan., died Jan. 23, 1951.

Francis A. Kransgrille (IND '15), New Albany, Ind., died recently. Dr. Kransgrille had retired from active practice some time ago.

★**H. A. Ohlgren** (CVC '18), 67, Cokato, Minn., died Jan. 12, 1951. Dr. Ohlgren was a member of the Minnesota State Veterinary Medical Association and of the AVMA.

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Abbreviations (*Continued*)

Abbreviations of foreign terms are always italicized in AVMA publications. Following are some of the more common foreign terms used in veterinary medical writings:

a. v. (*ad valorem*)—to that value.
ad inf. (*ad infinitum*)—unlimited.
ad lib. (*ad libitum*)—at one's pleasure.
aq. bull. (*aqua bulliens*)—boiling water.
aq. com. (*aqua communis*)—common water.
aq. dest. (*aqua destillata*)—distilled water.
aq. ferv. (*aqua fervens*)—hot water.
b. i. d. (*bis in die*)—twice a day.
de d. in d. (*de die in diem.*)—from day to day.
et al. (*et alii*)—and others.
f. h. (*fiat haustus*)—make a draught.
ibid. (*ibidem*)—in that place.
id. (*idem*)—same.
ind. (*in dies*)—daily.
loc. cit. (*loco citato*)—in the place cited.
m.d. (*mano destra*)—right hand.
m.s. (*mano sinistra*)—left hand.
op. cit. (*opus citatum*)—the work cited.
q.d. (*quasi dicat*)—as if he should say.
q.s. (*quantum sufficiat*)—sufficient quantity.
q.v. (*quod vide*)—which see.
t.i.d. (*ter in die*)—three times a day.
viz. (*videlicet*)—namely.

(*To be continued*)

Impotence was reported as a side effect of antihistamine therapy (pyribenzamine, thephorin) in 2 human cases. Virility returned promptly after treatment was stopped.—*Ann. Allergy, May-June, 1950.*

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Notices of Coming Meetings must be received by 4th of month preceding date of issue

Animal Disease Research Workers in the Southern States. Annual meeting. School of Veterinary Medicine, University of Georgia, Athens, Ga., April 3-4, 1951. W. B. Bell, Virginia Agricultural Experiment Station, Blacksburg, Va., secretary.

Washington, State College of. Annual conference for veterinarians. State College of Washington College of Veterinary Medicine, Pullman, Wash., April 6-7, 1951. J. E. McCoy, chairman.

Northern Illinois Veterinary Medical Association. Spring meeting. Faust Hotel, Rockford, Ill., April 11, 1951. Dale R. Stephenson, 2338 Charles St., Rockford, Ill., secretary.

North Central Iowa Veterinary Medical Association. Spring meeting. Warden Hotel, Fort Dodge, Iowa, April 19, 1951. B. J. Gray, Box 797, Fort Dodge, Iowa, secretary.

Massachusetts Veterinary Association. Monthly meeting. Hotel Beaconsfield, Brookline, Mass. April 25, 1951. C. Lawrence Blakely, 180 Longwood Ave., Boston 15, Mass., secretary.

American Animal Hospital Association. Annual meeting. Chalfonte-Haddon Hall, Atlantic City, N. J., May 2-5, 1951. Wayne Riser, 5335 Touhy Ave., Skokie, Ill., secretary.

Kansas State College. Annual conference for veterinarians. Kansas State College School of Veterinary Medicine, Manhattan, Kan., June 1-2, 1951. E. R. Frank, chairman.

Texas Veterinary Conference. School of Veterinary Medicine, A. & M. College of Texas, College Station, Texas, June 7-8, 1951. R. D. Turk, chairman, conference committee.

Alabama Polytechnic Institute. Annual conference for veterinarians. Alabama Polytechnic Institute School of Veterinary Medicine, Auburn, Ala., June 7-9, 1951. R. S. Sugg, dean.

North Carolina State Veterinary Medical Association. Annual meeting. Hendersonville, N. Car., June 8-9, 1951. J. H. Brown, Tarboro, N. Car., secretary.

(*Continued on p. 26*)

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(COMING MEETINGS — *continued from p.* 24)

American Society for the Study of Sterility. Annual meeting. Ritz-Carlton Hotel, Atlantic City, N.J., June 8-10, 1951. Walter W. Williams, 20 Magnolia Terrace, Springfield 8, Mass., secretary.

North Dakota Veterinary Medical Association. Annual meeting. Rudolph Hotel, Valley City, N. Dak., June 10-12, 1951. T. O. Brandenburg, Capitol Building, Bismarck, N. Dak., secretary.

Oklahoma conference for veterinarians. June 11-12, 1951, veterinary clinic, Oklahoma A. & M. College, Stillwater, Okla. J. W. Wolfe, Oklahoma A. & M. College, School of Veterinary Medicine, Stillwater, Okla., chairman.

Ohio State University. Annual conference for veterinarians. College of Veterinary Medicine, The Ohio State University, Columbus, June 13-15, 1951. R. E. Rebrassier, chairman.

Georgia Veterinary Medical Association. Annual meeting. Atlanta Biltmore Hotel, Atlanta, Ga., June 16-18, 1951. Chas. C. Rife, 420 Edgewood Ave., N.W., Atlanta, Ga., secretary.

(*Continued on p.* 28)

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(COMING MEETINGS — *continued from p. 26*)

Massachusetts Institute of Technology. Special course in food technology. Massachusetts Institute of Technology, Cambridge 35, Mass., June 25 to July 13, 1951. Professor Walter H. Gale, director of the summer session.

New York State Veterinary Medical Society. Annual meeting. Mark Twain Hotel, Elmira, N.Y., July 10-13, 1951. J. S. Halat, 1231 Gray Ave., Utica, N.Y., executive secretary.

American Veterinary Medical Association. Annual meeting. Milwaukee Auditorium, Milwaukee, Wis., Aug. 20-23, 1951. J. G. Hardenbergh, American Veterinary Medical Association, 600 S. Michigan Ave., Chicago 5, Ill., executive secretary.

Canadian Veterinary Medical Association. Third annual meeting. Banff Springs Hotel, Banff, Alta., Sept. 8-11, 1951. J. G. Anderson, 1016 9th Ave. W., Calgary, Alta., chairman, local committee.

Second International Gerontological Congress. Hotel Jefferson, St. Louis, Mo., Sept. 9-14, 1951. E. V. Cowdry, 660 South Kingshighway, St. Louis 10, Mo., president.

Nutritional Conference for Veterinarians. Annual conference. Iowa State College, Ames, Iowa, Sept. 13, 1951. C. D. Lee, Iowa State College of Agriculture, Ames, Iowa, extension veterinarian.

Cornell Nutrition Conference for Feed Manufacturers. Statler Hotel, Buffalo, N.Y., Nov. 1-2, 1951. J. T. Reid, Department of Animal Husbandry, Cornell University, Ithaca, N.Y., chairman.

Regularly Scheduled Meetings

Bay Counties Veterinary Medical Association, the second Tuesday of each month. Russell P. Cope, 1205 San Pablo Ave., Berkeley 6, Calif., secretary.

Cedar Valley Veterinary Association, the second Monday of each month (except July and August) at Black's Tea Room, Waterloo. F. E. Brutsman, Traer, Iowa, secretary.

Central California Veterinary Medical Association, the fourth Tuesday of each month. Thomas Eville, Route 1, Box 136H, Fresno, Calif., secretary.

Chicago Veterinary Medical Association, the second Tuesday of each month. Robert C. Glover, 1021 Davis St., Evanston, Ill., secretary.

East Bay Veterinary Medical Association, bimonthly, the fourth Wednesday. O. A. Soave, 5666 Telegraph, Oakland, Calif., secretary.

Fayette County Veterinary Association, Iowa, the third Tuesday of each month, except in July and

(*Continued on p. 30*)

"CASE OF THE BEWILDERED DOG OWNER"

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Kellogg's GRO-PUP RIBBON and MEAL

THE would-be dog nutritionist has a tough "case"! He must know the many components needed for a *complete* ration... their proportions . . . how to preserve their values. No wonder he so often asks *you*, an expert, for advice! When he does, tell him about the COMPLETE food, Gro-Pup Meal and Ribbon.

Kellogg's scientists had one thought in mind: "Can we put into a single food everything a dog needs for balanced nutrition?" The result was Gro-Pup, *completely* nutritious and verified as such by the Joint Committee on Foods by A.V.M.A. and A.A.H.A. Add meat scraps or milk but they aren't necessary...Gro-Pup is COMPLETE!

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August, at Pa and Ma's Restaurant, West Union, Iowa. Donald E. Moore, Box 178, Decorah, Iowa, secretary.

Florida, North-East Florida Veterinary Medical Association, the second Thursday of each month, time and place specified monthly. J. O. Whiddon, 829 San Marco Blvd., Jacksonville, Fla.

Greater St. Louis Veterinary Medical Association. Ralston-Purina Research Building, St. Louis, Mo., the first Friday in February, April, June, and November. W. C. Schofield, Dept. of Animal Pathology, Ralston-Purina Co., St. Louis 2, Mo., secretary.

Houston Veterinary Medical Association, Houston, Texas, the first Thursday of each month. Edward Lepon, Houston, Texas, secretary-treasurer.

Illinois Valley Veterinary Medical Association, the second Wednesday of even-numbered months. R. A. Case, 400 S. Garden St., Peoria, Ill., secretary.

Indiana Tenth District Veterinary Medical Association, third Thursday of each month. L. A. Snider, New Palestine, Ind, secretary.

Jefferson County Veterinary Society of Kentucky, Inc., the first Wednesday evening of each month, in Louisville or within a radius of 50 miles. F. M. Kearns, 3622 Frankfort Ave., Louisville 7, Ky., secretary.

Kansas City Small Animal Hospital Association, the first Monday of each month, at the Hotel Continental. T. M. Eagle, Parkville, Route 2, Mo., secretary.

Kansas City Veterinary Medical Association, the third Tuesday of each month, in the Hotel Continental, 11th and Baltimore, Kansas City, Mo. K. M. Curts, 70 Central Ave., Kansas City 18, Kan., secretary.

Keystone Veterinary Medical Association, the Penn-Sheraton Hotel, 39th and Chestnut St., Philadelphia, Pa., on the fourth Wednesday of each month. Raymond C. Snyder, 39th and Woodland Ave., Philadelphia 4, Pa., corresponding secretary.

Maricopa County Veterinary Association, the second Tuesday of each month. Charles J. Prchal, 1722 East Almeria Road, Phoenix, Ariz., secretary.

Michiana Veterinary Medical Association, the second Thursday of each month. Write R. W. Worley, secretary, 3224 L.W.W., South Bend, Ind., for location.

Michigan, Southeastern Veterinary Medical Society. Herman Kiefer Hospital, Detroit, Mich., the second Wednesday of each month from October through May.

Milwaukee Veterinary Medical Association. Wisconsin Humane Society, 4150 N. Humbolt Ave., Milwaukee, Wis., the third Tuesday of each

(*Continued on p. 32*)

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• Farm animals thrive on salt. But they become still healthier, bigger, more productive, *more profitable*, when fed STERLING Trace-Mineral BLUSALT. For it provides salt plus these vital trace minerals:

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Effective, multi-purpose control of external animal parasites. *ORTHO* Lindane kills insects three ways—by contact, vapor fumes and stomach poisoning. Approved by the USDA for the following:

SCREW WORM—after three years of extensive tests, *ORTHO* 1038 Screw Worm Control containing Lindane in combination with DDT has been hailed by sheep and cattle stockmen as the most effective answer to the screw worm problem.

FLIES AND OTHER INSECTS IN DAIRY BARNS—also mange mites on animals. *ORTHO* Lindane offers rapid knock-down and residual fly control in dairy barns, milk sheds, livestock barns and other farm buildings.

LICE AND TICKS on sheep, cattle, hogs, horses and dogs.

SCAB AND SARCOPTIC MANGE on dairy and beef cattle, sheep and hogs.

High Safety Factor—Approved by USDA for lice and mange control on dairy cattle. Tests show no contamination in milk, when properly applied. *ORTHO* Lindane is not cumulative. Any taken in by the animal will soon pass off. It is also practically odorless.

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Catechu	20 gr.
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Creased for ease and convenience of dosing

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500	40.00	1000	75.00

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(COMING MEETINGS — *continued from p. 30*)

month. Kenneth G. Nicholson, 2161 N. Farwell Ave., Milwaukee, Wis., secretary.

Monterey Bay Area Veterinary Medical Association, the third Wednesday of each month. C. Edward Taylor, 2146 South Broad St., San Luis Obispo, Calif., secretary.

New York City Veterinary Medical Association. Hotel Statler, New York, N. Y., the first Wednesday of each month. C. R. Schroeder, Lederle Laboratories, Inc., Pearl River, N. Y., secretary.

North San Joaquin Valley Veterinary Medical Association, the fourth Wednesday of each month. V. E. Graff, Oakdale, Calif., secretary.

Orange Belt Veterinary Medical Association, the second Monday of each month. James R. Ketchersid, 666 East Highland Avenue, San Bernardino, Calif., secretary.

Orange County Veterinary Medical Association, bimonthly, the second Tuesday of each month. J. H. Bower, P. O. Box 355, Santa Ana, Calif., secretary.

Peninsula Veterinary Medical Association, the third Monday of each month. E. W. Paul, Box 866, Redwood City, Calif., secretary.

Pima County (Arizona) Veterinary Medical Association, the third Wednesday of each month, in Tucson. R. W. Adami, 2103 S. 6th Ave., Tucson, Ariz., resident secretary.

Portland (Oregon) Veterinary Medical Association, the second Tuesday of each month, in the Auditorium of the Upjohn Company. L. G. Nicholson, 8415 S.E. McLoughlin Blvd., Portland 2, Ore., secretary.

Redwood Empire Veterinary Medical Association, the third Thursday of each month. John E. Wion, 3164 Redwood Highway South, Santa Rosa, Calif.

Roanoke-Tar (N. Car.) Veterinary Medical Association, the first Friday of each month, 7:00 p.m., in Rocky Mount. G. L. Gilchrist, Edenton, N. Car., secretary.

Sacramento Valley Veterinary Medical Association, the fourth Friday of each month. R. C. Goulding, 11511 Capitol Avenue, Sacramento, Calif., secretary.

San Diego County Veterinary Medical Association, the fourth Tuesday of each month. R. J. McFarland, 3621 Jewell St., San Diego 9, Calif., secretary.

Southern California Veterinary Medical Association, the third Wednesday of each month. D. H. McDole, 8674 Melrose Ave., Los Angeles 46, secretary.

South Florida Veterinary Society, the third Tuesday of each month, 8:00 p.m., at the Peckway Skeet Club, Robert P. Knowles, 2936 N.W. 17th Ave., Miami, Fla., secretary.

Tulsa Veterinary Medical Association, the third Thursday of each month, 8:00 p.m., at the Tulsa Hotel. R. S. Todd, 1222 S. Lewis, Tulsa, Okla., secretary.

Foreign Meetings

First Pan American Veterinary Conference. Lima, Peru, Oct. 20-26, 1951. José Santivañez, dean, Veterinary College, San Marcos University, Lima, Peru.

Fort Dodge Laboratories Acquire New Plant

A supplemental plant at Okmulgee, Okla., has been acquired by Fort Dodge Laboratories, Inc., for the production of hog cholera antiserum and hog cholera virus. The move marks another major step in the company's plans for continuous expansion.

The Okmulgee plant covers 60 acres, with buildings of concrete and steel construction. Built in 1940, it is one of the most up-to-date plants of its type in the United States.

There is no change in the operation of the biological farm and laboratories at Fort Dodge, Iowa.

...The Buy of the Year!

THESE EXTRA FEATURES ASSURE EXTRA VALUE!

- Scratch-resistant top—61" x 22"
- Equipped with tie rods for quick, positive fastening of animals. Rods made of chrome-plated spring steel, adjustable ties of highly-polished aluminum.
- Top is free of sharp edges. Injury to animals is positively eliminated.
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- Operate with minimum strain on animal's stomach muscles while spaying.

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. . . Well-Built to Last Years Longer

This amazingly low cost Van-Don "Special" Veterinarian's Table offers most of the features usually found only in de luxe models. Made of the finest materials, it fills every need of small animal hospitals and private establishments. Full-size top provides 1342 square inches of *acid-resisting* working surface—*easy to keep clean.*

Heavy, circular 20" *non-tip* cast iron base is drilled for permanent installation. Single pier construction with 5" column finished in triple-coated white enamel. Table top, 37" high, assures maximum convenience and ease of operation. *Table is fully guaranteed as to workmanship and materials.*

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Bottoms are water-proof trays with ½" turned up edges, heavily soldered together. Braced, aluminum painted. 1½" angle iron frames. Door frames 1" O. D. pipe. Dog proof mesh filler welded to frame. All sheets heavily galvanized.

Completely Assembled. Satisfaction Guaranteed.
SIZES: 3 upper stalls 24" x 24" x 28" deep.
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Overall size: 6' wide x 5'6" high x 28½" deep.
Stalls Stand 6 in. off Floor.

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Ford DOUBLE FRAME Panel Runs insure SAFETY for your dogs. Chain link fabric is rust resistant, cannot be spread; permanently locked by INNER BAR FRAME. NO TIE WIRES TO RUST. Clamp together. No bolt holes to match. Portable or permanent construction.

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WANTED—partner-assistant. Guarantee $5,000 annually. Modern small animal hospital. In the East. State complete qualifications, experience, references, and personal description in first letter. Address "Box E 10," c/o JOURNAL of the AVMA.

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Association with mixed or large animal practitioner, leading to partnership or ownership, desired by 1951 graduate. Minnesota or Wisconsin preferred. Veteran, married. Address "Box F 1," c/o JOURNAL of the AVMA.

Veterinarian, 1941 Lithuanian university graduate, 32, married, desires position as assistant in mixed practice or as meat inspector. First citizenship papers taken out. Prefers mideastern states. Address "Box F 3," c/o JOURNAL of the AVMA.

Veterinarian, graduate of European university, 38 years old, married, desires position as assistant in mixed practice. Arkansas, Kentucky, or Tennessee preferred. Address "Box F 4," c/o JOURNAL of the AVMA.

POSITION WANTED—graduate, single, desires position with practitioner engaged predominantly in cattle practice. Has Connecticut license. Will go North or West. Address "Box F 5," c/o JOURNAL of the AVMA.

Latvian veterinarian with experience in general practice in U.S.A. desires state employment as brucellosis tester, meat inspector, or as assistant in mixed practice. Address "Box F 6," c/o JOURNAL of the AVMA.

(Continued on p. 36)

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Authoritative information on the scientific care and feeding of dogs. Published by Albers Milling Company (a division of Carnation Company) under the supervision of Dr. E. M. Gildow, B.S., M.S., D.V.M., Director of Research.

No. 10

DOG RESEARCH NEWS

Economical Puppy Diet Proves to be More Efficient as Well

Each litter at the Friskies Research Kennels is divided into two groups at weaning time. One group receives the foods that custom and opinion have so long designated as essential, such as milk, eggs, liver and prepared vitamins. The other group gets Friskies.

A detailed record is kept of growth, condition, alertness, etc., of these puppies. A lengthy test with many litters proves the Friskies diet to be far more efficient and economical, since there is less likely to be an excess or shortage of costly amino acids, vitamins and minerals.

Split litter tests prove Friskies more efficient and economical than foods dictated by custom.

Friskies is one meal that is scientifically balanced to give puppies, as well as grown dogs, every single food element they are known to need for complete nourishment. It is the result of over 50 years' experience in animal nutrition and 19 years of careful research and study of dog feeding.

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Another hazard is that of tape worm infestation, the cystic forms of which are found in beef and mutton. The tape worm cysts contain tape worm heads which, when taken into the digestive tract, attach to the intestinal lining and grow into adult tape worms.

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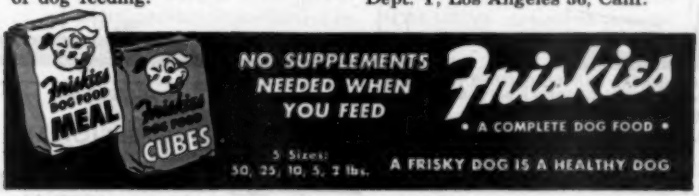
ADDRESS YOUR QUESTIONS to Friskies, Dept. Y, Los Angeles 36, Calif.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NO SUPPLEMENTS NEEDED WHEN YOU FEED
Friskies
• A COMPLETE DOG FOOD •
5 Sizes: 50, 25, 10, 5, 2 lbs.
A FRISKY DOG IS A HEALTHY DOG

(CLASSIFIED ADS—*continued from p. 34*)

June, 1951 graduate of AVMA-approved school desires position as assistant in mixed or large animal practice. Address "Box F 10," c/o JOURNAL of the AVMA.

Draft-exempt, June, 1951 Michigan State College graduate desires position with future in mixed or large animal practice. Midwest preferred. Some experience. Age 32, married, Lutheran. Address "Box F 8," c/o JOURNAL of the AVMA.

Veterinarian, graduate of European university, will take any suitable position in field. Address "Box F 11," c/o JOURNAL of the AVMA.

Wanted—Practices

PRACTICE WANTED—experienced veterinarian desires to purchase or lease modern small animal hospital, either one- or two-man practice. California or Southwest location preferred. Married, service exempt. Address "Box E 2," c/o JOURNAL of the AVMA.

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(*Continued on p. 38*)

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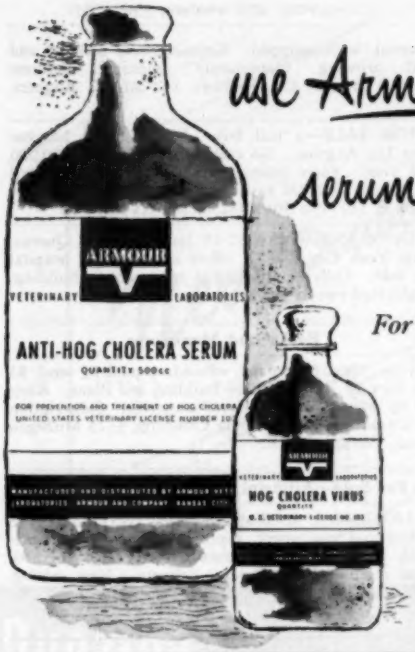

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P/D

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- Growing pups
- Gestation in bitches
- Lactation
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- Ear Trimming
- Hookworm disease
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(CLASSIFIED ADS—*continued from p. 36*)

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Soon time to repair, rebuild, remodel; send $3 for copy of Judy's Kennel Building and Plans. Keep up on dogs with *Dog World* magazine. Subscription $3 a year. Judy Publishing Company, 3323 Michigan Blvd., Chicago 16, Ill.

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ARTIFICIAL INSEMINATION INSTRUMENTS —Essential equipment, replacement parts and materials, designed and manufactured especially for artificial insemination. Prompt delivery. New catalog. Address: Breeder's Equipment Co., Flourtown, Pa.

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Duozine *SODIUM, 10%, SOLUTION*

(DIA-MER-SULFONAMIDES, ABBOTT)

(ABBOTT'S SODIUM SULFADIAZINE, 5%, SODIUM SULFAMERAZINE, 5%)

For high blood levels, few side-effects, better control of bacterial infections—try new Duozine Sodium, 10%, Solution, Abbott's mixture of equal parts of sulfadiazine and sulfamerazine. Note these advantages:

The component sulfonamides are independently soluble in the urine, can be administered in high potency with greatly reduced danger of crystalluria and renal blocking. The drugs are rapidly absorbed, highly penetrating, effective against a wide bacterial spectrum.

EASY TO USE—JUST HANG IT UP

The hang-up bail wire on each container of Duozine Solution makes administration easy, especially with Venopak®, Abbott's completely disposable venoclysis unit. Any standard I.V. equipment may be used, however. Order Duozine Sodium, 10%, Solution now, for trial—and why not try Venopak, too? Available through your usual source of supply; Duozine Sodium, 10%, Solution in 500-cc. hang-up containers. Abbott

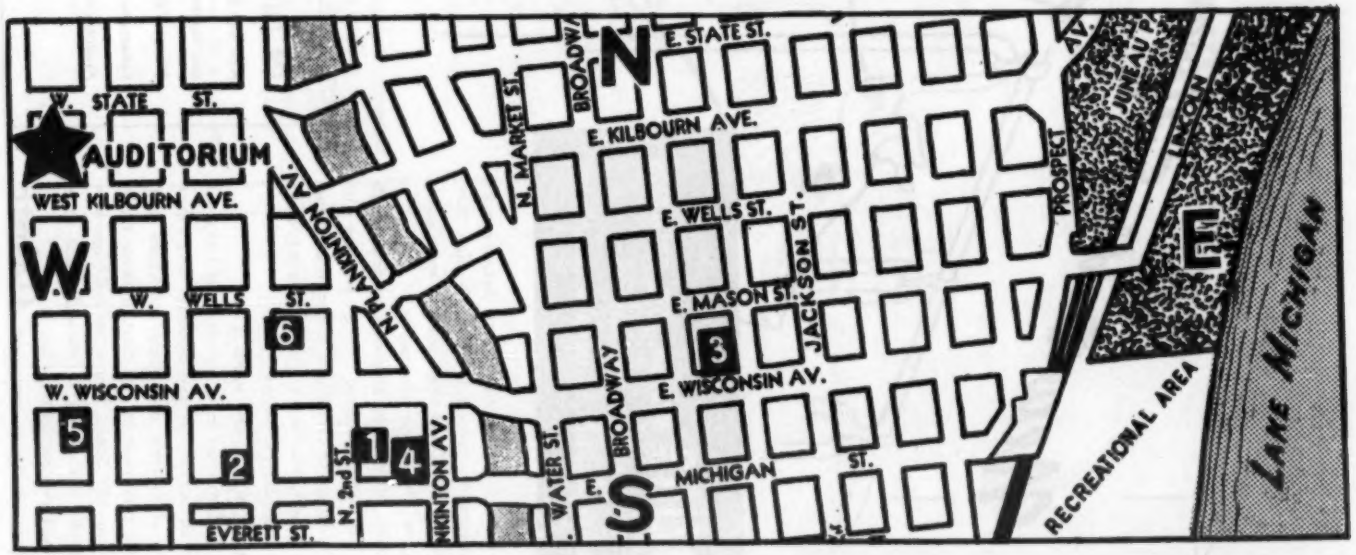
FOR FOLLOW-UP THERAPY

New high potency Truozine,* 60 grs., Tablets. Each tablet contains 20 grs. each sulfadiazine, sulfamerazine and sulfamethazine. Available in bottles of 50 tablets.

*Trade Mark

Street Diagram of Milwaukee, Wisconsin, Showing Hotels Selected for AVMA Meeting and Their Proximity to the Auditorium

Note: *The section shown on this diagram lies in the southeastern part of Milwaukee and represents only a small portion of the city's total area.*



1. Antlers 2. Medford 3. Pfister 4. Plankinton House 5. Schroeder 6. Wisconsin

HOTEL RESERVATIONS — MILWAUKEE CONVENTION

Eighty-Eighth Annual Meeting, AVMA, August 20-23, 1951

Selected hotels listed below are all near the Milwaukee Auditorium, where convention activities will be centered. Fill out reservation form and mail it directly to hotel of your first choice. If that hotel is filled, it will forward your request to another hotel you have named. Confirmation will come from hotel which accepts reservation. Since this is an auditorium convention, there will be no headquarters hotel.

HOTELS AND RATES* — SEE LOCATIONS ON OPPOSITE PAGE

Hotel	Single	Double (with Double Bed)	Double (with Twin Beds)
1. Antlers	$2.25-5.00	$3.50-6.00	$6.00
2. Medford	3.00-4.00	4.25-5.25	6.00-7.00
3. Pfister	3.50-8.00	6.50-10.00	7.00-12.00
4. Plankinton House	3.50-6.00	6.00-8.00	6.50-9.00
5. Schroeder	3.75-10.00	6.50-10.00	8.00-12.00
6. Wisconsin	3.50-7.50	5.50-9.00	7.50-10.00

*Information about availability and rates of suites may be obtained on request to hotels of your choice. See reservation form below.

Cut Off Here

HOTEL RESERVATION FORM — AVMA CONVENTION

To: (Name of Hotel) ..... Date .....

Milwaukee, Wis.

Please make reservations indicated below:

(Three choices MUST be shown.)

First choice hotel .....

Second choice hotel .....

Third choice hotel .....

Accommodations and Rates Desired:

☐ Single room at $..... per day

☐ Double-bed room at $..... per day

☐ Twin-bed room at $..... per day

☐ Send me information about suites

Arriving on (date) ..... at..... a.m..... p.m.

Leaving on (date) ..... at..... a.m..... p.m.

Room will be occupied by:

Name ..... City and State .....

Name ..... City and State .....

Your Name (print or type) .....

Street Address .....

City ..... Zone ..... State .....

For Involvements of Joints, Muscles, Tendons —

NUMOTIZINE®

Topical Analgesic-Decongestive Cataplasm

... relieves pain

... increases local circulation

... reduces swelling

... easy to apply and remove

Apply as a poultice — remains effective 8 hours or more.

Supplied in 30 ounce and 3½ lb. resealable glass jars.

NUMOTIZINE, INC.,

900 North Franklin Street, Chicago 10, Illinois

Arnold Laboratories Appoints General Manager

Dr. Eugene C. Kandel (OSU '46) was appointed last December to the office of general manager of Arnold Laboratories, Newcastle, Ind. Previous to his association with Arnold Laboratories, Dr. Kandel was in general practice at Findlay, Ohio.

Dr. Eugene C. Kandel

At Ohio State University, where he received his D.V.M. degree, he was editor of the *Agricultural Student* and a member of the All Agricultural Council. In the College of Veterinary Medicine, he was voted the outstanding member of his class.

Provides an accurate pattern against which to cut with knife or razor blade. Fits firmly, cannot move or slip when clamped into position. Made of non-rusting, light, cast aluminum, highly polished. Lasts a lifetime with minimum care. Simplicity of design and construction reduces possibility of breakage or mechanical failure. Forms immediately available to provide distinctive marking of these breeds:

Boxer — postpaid $15.00
Boston Terrier — postpaid $15.00
Great Dane — postpaid $15.00
Doberman — postpaid $15.00
Set of above four — postpaid $50.00

These patented "championship" forms are patterned after markings of winners of top honors in show competition. Forms for other breeds made on special order. Sold to veterinarians only. Send check or money order.

MacALLAN LABORATORIES
Route No. 2, Box 420 Lansing, Michigan

THE EXCEPTIONAL SCENTING POWER OF *BLOODHOUNDS* HAS RECENTLY BEEN PUT TO NEW USE IN *DETECTING GAS LEAKS* IN UNDERGROUND MAINS

CONTROL SWINE ENTERITIS!

VETERINARY

SULFATHALIDINE®

phthalylsulfathiazole

Just *one dose daily* of SULFATHALIDINE® phthalylsulfathiazole is remarkably effective in curtailing losses from swine enteritis.

Given orally, SULFATHALIDINE is nontoxic, since less than 5% is absorbed and over 95% of its antibacterial action is in the intestinal tract. Thus, administration of SULFATHALIDINE results in smaller dosage, more economical treatment.

SUPPLIED:

No. 2264—4.0-Gm. (60-gr.) tablets (slotted), bottles of 100 and 500.

No. 2261—0.5-Gm. (7.7-gr.) tablets (slotted), bottles of 100 and 1,000.

No. 2267—¼-lb. and 1-lb. bottles of powder.

'BOVIMIDE'

TRIPLE SULFONAMIDE SUSPENSION WITH KAOLIN

Given orally, 'BOVIMIDE', new triple sulfonamide suspension, is equally effective in treatment of swine enteritis, or when used prophylactically where the disease is endemic. It provides the bacteriostatic action of SULFATHALIDINE, sulfamerazine and sulfamethazine, plus protective, adsorbent kaolin. **Supplied: No. 2357**—Bottles of 16 fluid-ounces.

Each 100 cc. of 'BOVIMIDE' contains:

SULFATHALIDINE® phthalylsulfathiazole	6.8 Gm.
Sulfamerazine	0.6 Gm.
Sulfamethazine	0.6 Gm.
Kaolin	10.0 Gm.
Alcohol	5%

VETERINARY DIVISION SHARP & DOHME **PHILADELPHIA 1, PA.**

BRANCHES: Atlanta, Baltimore, New York, Philadelphia, Denver, Memphis, Los Angeles, Columbus, Boston, Chicago, Kansas City, San Francisco, Portland, Dallas, St. Louis, New Orleans, Minneapolis

Instantly Ready . . . Immediately Effective!

Gebauer's Astringent Spray

Gebauer's Astringent Spray, an antiseptic and analgesic preparation, combining Tannic Acid, Chlorbutanol, and Alcohol, has rapidly been gaining preference among veterinarians.

Indicated in the treatment of many types of effusive affections such as those that are often designated "weeping eczema"; in the treatment of ordinary wounds and abrasions, and ordinary burns.

The solution omitted from the famous Gebauer "Dispenseal" bottle with the force of a jet stream insures rapid, thorough application, leaving a thin transparent film of tannic acid clinging firmly to the skin. A transparent protective coating promptly forms on minor cuts, lacerations, and abrasions. Usually, in cases of explosive type eczema, weeping is quickly controlled, and in most cases no further dressing or bandaging is necessary. Supplied with tear-off label. For more complete information, write your supply house or Dept. J, THE GEBAUER CHEMICAL CO.

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These laboratories have been established to aid veterinarians in the diagnosis of obscure as well as common ailments in large and small animals. An expert and experienced veterinary pathologist heads our staff to give quick and accurate diagnosis at all times.

Our service includes fecal examinations, urinalysis, blood counts, culture work, tissue sections, skin scrapings, and autopsies, and is designed to assist owners and breeders of stock of all kinds including dogs, horses, cattle, poultry, hogs and sheep.

Descriptive pamphlet, sample containers and fees on request.

Dr. Seymour Nord, Pathologist
Dr. James R. Kinney, Consultant

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• You need not worry any more over urgent calls that take you over bad country roads. Lantz Tire Traction Clamps will *get your car out of mud, snow or over ice* in a jiffy. They are easy and simple to use...no chains, or straps to fuss with...nothing to get out of order. Built to last a lifetime.

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SAVE TOWING COSTS, TIME, WORK AND WORRY

Nothing else like this new, quicker, easier way to pull out a stuck car. The Lantz Clamp slips over tire, and a push of the lever locks it to tire and rim. With one on each rear tire, your car literally "walks" out of trouble. Then a push of the lever, removes the clamps to be tossed into the trunk of car. You attach the clamps standing up . . . not on your knees in mud or snow. Adjusting screw compensates for tire width and degree of clamp pressure. Non-slip edge grips into ice, bites down into mud or snow.

Made only in sizes to fit 5:90 to 7:00 tires.

Per set of two **$8.95** Specify tire size.

GET YOURS TODAY. Order direct or write for literature and name of Lantz dealer. Address Dept. CD-10.

Attach Clamp Standing Up.

Easy does it; 2 clamps and a lever.

LANTZ MANUFACTURING COMPANY, INC. • VALPARAISO, INDIANA

"The bonds William and I bought for our country's defense helped build a house for us!"

HOW U. S. SAVINGS BONDS PAID OFF FOR MRS. ROSE NYSSE OF BRISTOL, PA.

"There's nothing more wonderful than a house and garden of your own," says Mrs. Nysse, "and no surer way to own one than to save for it through U. S. Savings Bonds and the safe, sure Payroll Savings Plan!"

Mrs. Rose Nysse says, "In 1942 William and I started making U. S. Savings Bonds a part of our plan for financial security. I joined the Payroll Savings Plan at the Sweetheart Soap Co. where I work, and began buying a $100 bond a month, knowing my money was safe and working for me. U. S. Savings Bonds certainly make saving easier!"

"Savings Bonds alone made a $5,000 down payment on our house!" says Mrs. Nysse. "Altogether, we've saved $8,000 just in bonds bought through Payroll Savings, and we are keeping right on. When we retire, our bonds will make the difference between comfort and just getting by. Bonds offer a patriotic and practical way to security."

You can do what the Nysses are doing —the time to start is now!

Maybe you can't save quite as much as William and Rose Nysse, maybe you can save more. But the important thing is to *start now!* It only takes three simple steps.

1. Make the big decision—to put saving *first*—before you even draw your pay.
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You'll be providing security not only for yourself and your family, but for the blessed free way of life that's so very important to every American.

FOR YOUR SECURITY, AND YOUR COUNTRY'S TOO, *SAVE NOW*— THROUGH REGULAR PURCHASE OF U. S. SAVINGS BONDS!

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SUISAL tablets

arsenic tonic for swine

Suisal Tablets exert prompt action against ENTERIC CONDITIONS that are characterized by SCOURING—a practice problem so frequently encountered by veterinarians. And too, Suisal Tablets have the added advantage of being equally adaptable for either individual or herd treatment. Convenient and economical, this arsenic drinking water medication is easy to prepare—merely add one fast-disintegrating Suisal Tablet to each gallon of drinking water.

SUPPLIED: Bottles of 100

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PUPPY PROBLEMS

Spring — the natural birth period for puppies — brings conditions most conducive to disease.

Distemper — the most troublesome puppy disease — is ever present; but when susceptible animals are in greatest numbers and conditions are ideal, more serious trouble is inevitable unless proper precautions are taken.

Intradermal Canine Distemper Vaccine (Lockhart) was developed for such problem times. It is produced from tissues richest in virus (those of epithelial origin) selected from subjects pen-exposed to canine distemper, and harvested at the time when virus content is highest. Thus it is a concentrated virus which has been selected with care, and killed for greatest safety.

Intradermal Canine Distemper Vaccine (Lockhart) utilizes two important scientific facts: 1. Tissues of highest virus content are selected for production. 2. Skin is an extremely important organ of anti-body production and body defense.

Intradermal Canine Distemper Vaccine (Lockhart) is a product proved in the laboratory and in the field as an efficient and practical method of canine distemper control. It continues to be the choice of many clinic directors, small animal specialists, and general practitioners.

Intradermal Canine Distemper Vaccine (Lockhart) is a strictly professional vaccine produced by an institution dedicated to the welfare of the veterinary profession. It is designed for use of the veterinary profession only. It is supplied in convenient packages of one and five treatments, has a long dating, and is ideally suited to the needs of the profession.

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every bottle UNIFORM
because we make every bit of it!

From start to finish, D·C·M (Jen-Sal) is our product. Step by step production control is your assurance of uniform clinical response.

The high performance of D·C·M in field usage—quick recoveries with fewer relapses—has led many leading veterinarians to standardize on D·C·M (Jen-Sal). In cases of complicated and primary milk fever, grass tetany, railroad sickness, wheat poisoning, acetonemia, forage poisoning, and in other syndromes with low blood levels of magnesium as well as calcium, D·C·M is preferred.

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